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EIS APPENDIX C

MYERS ENDANGERED SPECIES ACT COORDINATION

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BIOLOGICAL ASSESSMENT
OHIO RIVER
J. T. MYERS LOCKS AND DAM

POSEY COUNTY, INDIANA

Submitted to

US Army Corps of Engineers
Louisville District

Louisville, Kentucky

Submitted by

GEC
Gulf Engineers & Consultants

Baton Rouge, Louisiana

August 1999

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Final Report

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OHIO RIVER
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Prepared for

U.S. Army Corps of Engineers
Louisville District
Louisville, Kentucky

Prepared by

G.E.C., Inc.
Baton Rouge, Louisiana

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1.0 INTRODUCTION, PURPOSE, AND NEED

G.E.C., Inc. (Gulf Engineers and Consultants) was contracted by the Louisville District, U.S. Army Corps of Engineers (USACE) to prepare a Biological Assessment (BA) of the Indiana bat (*Myotis sodalis*), bald eagle (*Haliaeetus leucocephalus*), and the fat pocketbook mussel (*Potamilus capax).* Potential impacts to these species resulting from the proposed expansion of the northernmost lock at the J.T. Myers Locks and Dam were identified. This work was conducted under Contract No. DACW27-97-D-0013, Delivery Order No. 0017.

This document was prepared in accordance with the guidelines in Section 7 of the Endangered Species Act of 1973, as amended. Typically, BAs include the results of on-site surveys to determine the occurrence of a species, however, in this case, sufficient information is available for the Indiana bat, and the bald eagle to determine that potential habitat exists to support these species. A survey for the fat pocketbook mussel was conducted, and the results are included herein and the report of findings included as Appendix A. Information contained in this BA includes the presentation of applicable literature concerning the life history, ecology, specific characteristics and habitat requirements of the Indiana bat, the bald eagle, and the fat pocketbook mussel. Known or high probability of occurrence areas within the proposed project area and an assessment of impacts associated with the proposed activities on the aforementioned endangered species are also included.

J.T. Myers Locks and Dam is located on the Ohio River at approximate River Mile 846 (Figure 1) and are administered and maintained by the Louisville District U.S. Army Corps of Engineers. Operation of the locks and dam is essential to the continued use of the Ohio River for waterborne commerce and transport.

The U.S. Army Corps of Engineers is currently conducting the Ohio River Main Stem Systems Study (ORMSS) to identify the best long-term agenda for maintaining a viable navigation system on the main-stem of the Ohio River. Specifically, the study is evaluating the Operation and Maintenance, Major Maintenance, Major Rehabilitation and New Construction investment needs for the 19 navigation locks and dams on the Ohio River Main Stem - with an aim to identify the optimum plan for meeting these needs over the next 40-50 years. These structures are crucial to the orderly development of navigation throughout the Ohio River Basin. As traffic grows through the Ohio River Valley, several lock structures will experience increasing delays. which may be particularly severe during times of maintenance (when one of the existing chambers at any one of the facilities must be closed for routine or emergency repairs or accidents). Other locks will become increasingly unreliable due to age and cycles of use.

The ORMSS final report (due for completion in 2001) is intended to be an authorization document for near-term needs (over the near 10-15 years) and a Master Plan for long-term needs. During the course of the study, a clear justification was found for authorization of large scale improvements at two Ohio River facilities - namely J.T. Myers Locks and Dam and Greenup Lock and Dam. An interim report was prepared which provided the justification and rationale for proceeding to Congressional authorization for these improvements at this time - in advance of the final ORMSS report.

In terms of both traffic levels and delays, J.T. Myers Locks and Dam is one of the two busiest lock projects on the Ohio River for which major improvements are not already underway or authorized. Second only to Smithland Lock and Dam, which is located about 80 miles downstream of J.T. Myers, J.T. Myers Locks and Dam is the busiest in the U.S. in terms of traffic volume. However, Smithland Lock and Dam has two 1,200-ft long locks to efficiently process long commercial tows, whereas J.T. Myers Locks and Dam has only one 1,200-ft chamber, and a smaller 600-ft auxiliary lock.

When both lock chambers at J.T. Myers are functioning normally, the capacity of the existing facility is generally adequate to serve traffic levels both now and over the next 10 to 20 years. However, delays do occur since (as in all traffic systems) two, three or more tows sometimes arrive at the lock at nearly the same time. During the last three years, the average delay per tow at J.T. Myers has averaged approximately 45 minutes. By comparison, the average delay at the larger Smithland Locks, which has twin 1,200-ft chambers and about the same traffic level, is about 10 minutes per tow. Given the fact that about 6,200 tows per year transit J.T. Myers Locks and Dam, the delay costs attributable to not having a second 1,200-ft lock chamber at J.T. Myers is about $1.5 million per year at the present time (for a year in which no major maintenance occurs at the facility).

In general, having a second full-size (1,200-ft long) chamber at J.T. Myers Locks and Dam would yield a reduction in tow transit costs on a day-in, day-out basis, and the value of this benefit would grow over time as traffic levels increase. This benefit would be most noticeable when it becomes necessary to close one of the locks for maintenance or emergency purpose.

2.0 PROJECT DESCRIPTION

The J.T. Myers Locks and Dam would be upgraded by constructing an extension of the existing 600-ft lock to provide an additional 1,200-ft lock. Figures 2 through 7 provide a layout of the proposed construction areas and a proposed construction sequence. These figures were generated and provided by USACE.

Construction of this project would generate approximately 500,000 cubic yards of dredge material (clay, sand, and silt), that would require disposal. Construction activities would also include removal of an approximate 2100-ft long portion of the right descending bank (100 feet wide with the exception of the first and last 300 feet which is 50 feet wide) downstream of the locks and dams to improve lower approach access (Figure 8). Four disposal alternatives are being considered: (1) On-Site Disposal (Preferred Alternative); (2) Off-Site Disposal on State Owned Lands; (3) Off-Site Disposal on Private Property; and (4) No-Action. Within each of the three action alternatives, two alternate disposal designs exist: contemporary (spread out material evenly within the disposal area) and beneficial use for environmental enhancement/restoration. The following subsections describe each alternative disposal site and disposal design.

2.1 Alternative 1: On-Site Disposal (Preferred Alternative). On-site disposal would be confined primarily to the southern portion of the approximate 400-acre site adjacent to the existing J.T. Myers Locks and Dam (Figure 9). The habitats present within the proposed disposal areas on-site include an open prairie, and ash/hackberry scrub shrub. The prairie was established by the USACE in partnership with the Indiana Department of Natural Resources in 1996 as a restoration project under Section 1135 of the Water Resources Development Act of 1986. It was planted in a mixture of native prairie grasses and range plants. It is easily recognized by the presence of little and big bluestem as well as other annuals and perennials.

The ash/hackberry scrub is a non-wetland opening adjacent to and north of the maintained clearing and prairie areas and is comprised of American elm (*Ulmus americana*), hackberry (*Celtis laevigata*) and green ash (*Fraxinus pennsylvanica*) saplings with a dense understory of leadplant, poison ivy (*Toxicodendron radicans*), and various perennials and annuals. It appears that these areas may have been cleared for agricultural use prior to Corps ownership and has since been used for spoil disposal.

Based on the findings of an on-site wetland delineation conducted in 1999, no wetlands are present within the proposed on-site disposal area.

2.1.1 Contemporary Design. Under this alternative disposal design, approximately 500,000 cubic yards of material would be deposited over approximately 100 acres [20.4 acres of prairie, 69 acres of frequently maintained open grassland, and approximately 11 acres of scrub shrub habitat (Figure 9)]. Upon project completion, the prairie and the frequently maintained open grassland would be restored using the original project specifications. The scrub shrub area would be re-planted using a mixture of indigenous bottomland hardwood species.

2.1.2 Beneficial Use for Environmental Enhancement. Originally, it was proposed that the dredge material be used to construct a series of levees throughout the site to create greentree reservoirs for waterfowl management. However, after a thorough on-site reconnaissance it was determined that a sufficient amount of natural levees and man-made roads exist on the site, and that management of the hydroperiod through a control structure in the southwest portion of the site, which is maintained by the Hovey Lake Manager, has created a setting for a majority of the site to function as a greentree reservoir in the winter. Further, it was discussed that the impacts associated with construction of levees would not justify the benefits gained through creation of a greentree reservoir in this area. Therefore, this alternative disposal design was eliminated from further consideration.

2.2 Alternative 2: Off-Site Disposal on State Owned Lands. Indiana Department of Natural Resources (IDNR) owns an approximately 143-acre tract located northeast of Hovey Lake (Figure 10). This area is currently under an agriculture outlease and is planted in row crops including soybeans and/or corn depending on the market and on-site conditions. Portions of this area undergo periodic flooding.

2.2.1. Contemporary Design. Under the contemporary design, the area would receive approximately 500,000 cubic yards of dredge material. The material would be evenly spread to raise the elevation approximately two feet, and the area would continue to be farmed.

2.2.2 Beneficial Use for Environmental Restoration. Under this alternative, a series of small levees would be constructed to create cells to be managed as moist soil units for waterfowl management. The water levels would be controlled by a series of control structures, and they would be inundated to approximately 12 inches beginning in the fall and gradually drained by the early spring. Specific location and design would be generated at a later date. It is anticipated that construction of the levees would not utilize the entire amount of material generated (500,000 cubic yards), and therefore this method would also include some of the contemporary design described in Section 2.2.1.

2.3 Alternative 3: Off-Site Disposal On Private Property. The USACE has selected for evaluation an alternate disposal site adjacent to the existing lock and dam site and bordering State-owned lands that are managed by IDNR. This approximately 467-acre tract (Figure 10) contains a mixture of bottomland hardwoods and open agriculture fields.

2.3.1 Contemporary Design. Under the contemporary design, the areas currently being farmed would receive approximately 500,000 cubic yards of material. The material would be evenly spread over approximately 263 acres (open agriculture land) to raise the elevation approximately one foot, and the area would continue to be farmed.

2.3.2 Beneficial Use for Environmental Restoration. Under this alternative, the areas currently being farmed would receive approximately 500,000 cubic yards of material. The material would be evenly spread over approximately 263 acres to raise the elevation approximately one foot, and the area would be restored to bottomland hardwoods. The intent of the restoration would be to reduce forest fragmentation in the area and provide additional wildlife habitat. This would also provide a wildlife corridor to adjacent wooded tracts.

3.0 LITERATURE REVIEW

3.1 Indiana Bat (*Myotis sodalis*)

3.1.1 Species Description. The Indiana bat is a medium-sized monotypic species (no subspecies) of the genus *Myotis* closely resembling the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*), but differing in coloration. The head and body length range from 1-5/8 to 1-7/8 inches. Its forearm length is 1-3/8 to 1-5/8 inches (USFWS, 1999). The heel of the foot (calcar) is strongly keeled with the hind feet smaller and more delicate than that of the little brown bat. The Indiana bat's fur is a dull grayish chestnut (as opposed to the bronze fur of the little brown bat) with the basal portion of the hairs on the back a dull lead color. Underparts are pinkish to cinnamon but do not contrast as strongly as that of the little brown bat or the northern long-eared bat.

3.1.2 Taxonomic Status. The Indiana bat is in the order *Chiroptera*, family *Vespertilionidae*.

3.1.3 Geographic Range. The Indiana bat occurs in the midwestern and eastern United States from the western edge of the Ozark region in Oklahoma to southern Wisconsin, east to Vermont, and as far south as the northern portion of Florida. The Indiana bat is apparently absent south of Tennessee in the summer and absent from Michigan, Ohio, and northern Indiana, during the

winter, where suitable caves and mines are unknown. During the winter, Indiana bats are restricted to suitable hibernacula primarily located in irregular limestone regions with sinks, underground streams, and caverns located in the east central United States.

More than 85 percent of the range wide population occupies nine Priority 1 hibernacula (hibernation sites with a recorded population >30,000 bats since 1960 – although two of these currently have extremely low numbers of bats). Indiana, Kentucky, and Missouri each contain three Priority 1 hibernacula. Priority 2 hibernacula (recorded population >500 but <30,000 bats since 1960) are known from the aforementioned states, as well as Arkansas, Illinois, New York, Ohio, Tennessee, Virginia, and West Virginia. Priority 3 hibernacula with recorded populations <500 bats or records of single hibernating individuals have been reported in 17 states (USFWS, 1999).

3.1.4 Habitat. Winter habitat for the Indiana bat includes limestone caves and mines that maintain temperatures appropriate for hibernation. Ideal sites are those with a low probability for freezing with temperatures 50E Fahrenheit (F) when they arrive in October and November. Early studies identified a preferred mid-winter temperature range of 39E–46E F, but a recent examination of long term data suggests that a slightly lower and narrower range of 37E–43E F may be ideal for this species (USFWS, 1999). Studies show that humidity is above 74 percent but below saturation, and averaging 87 percent during hibernation, with humidity potentially being an important factor in successful hibernation.

Summer habitat requirements for this species are not as well documented as winter habitat requirements. Historically, floodplain and riparian forests were thought to be primary roosting and foraging habitats during the summer. However, recent records show males to use upland forests for roosting with foraging occurring in upland forests, old fields, and pastures with scattered trees. Summer foraging by females and juveniles is limited to riparian and floodplain areas. Creeks are apparently not used if riparian trees have been removed (USFWS, 1991). Female bats and juveniles form nursery colonies in trees with loose or exfoliating bark, with males roosting individually, or in small numbers, in similar structures. Records of Indiana bats being found in old buildings and under bridges also exist.

There are recent records of the Indiana bat from Hovey Lake (which is within one mile of the proposed project site) and other nearby forests. Suitable summer habitat exists on the proposed project site; roosting habitat is present in the central and northern portion of the site, and foraging habitat is present throughout the site.

3.1.5 Life History. Hibernation of Indiana bats begins in October and extends through April (September–May in northern regions), depending on local weather conditions. The Indiana bat hibernates in large clusters ranging up to 300 bats per square foot. Table 3.1 depicts the annual chronology of Indiana bat.

TABLE 3.1. INDIANA BAT ANNUAL CHRONOLOGY

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Both sexes:											
									Hibernation		
Hibernation											
Females			Emerge		Pregnant			Swarming			
Females					Lactating						
Young					Born	Flying					
Males			Emerge					Swarming			
JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC

Source: U.S. Fish and Wildlife Service, 1999.

The bats arrive at the hibernacula locations prior to hibernation (August to September) and begin "swarming." Swarming is a behavior where large numbers of bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in the caves during the day (Cope and Humphrey, 1977). This behavior continues for several weeks with mating occurring towards the end of this period. During the swarming period, the males remain more active over a longer period than the females, possibly to mate with late arriving females. As Indiana bats forage, prior to hibernation, they replenish fat supplies that were depleted during migration. Hibernation generally occurs in the same cave where swarming occurs, but swarming has been documented in caves other than hibernaculum sites (USFWS, 1999). Females begin hibernation directly after mating, with the remaining majority of both sexes hibernating by the end of November. During hibernation, bats form large, tight, compact clusters. Individuals hang by their feet from the ceiling. Approximately every eight to 10 days, individuals awaken and spend approximately one hour flying around the cave, or joining a small cluster of active bats before returning to hibernation.

Female Indiana bats store semen during the winter and become pregnant after emergence from hibernation through a process known as delayed fertilization. Females emerge from hibernation earlier than do the males. Once females arrive at their summer habitat, they utilize a number of small roost sites until a larger maternity colony (100 or fewer adults) is established. Young (single bat per adult) are born in late June to early July and are able to fly between mid July and early August. Males disperse throughout the range and either roost individually or in small numbers in or near the same type of trees as the females, with some males remaining near the hibernaculum. The remainder of the summer is spent storing fat reserves for the fall migration.

Indiana bats feed strictly on flying insects, the type of which depends on the foraging environment. They will feed on both aquatic and terrestrial insects. Diet varies seasonally and variation is observed among different ages, sexes, and reproductive status groups (Belwood, 1979; Lee, 1993). It is suspected that due to the higher energy demands of reproductively active females and juveniles, there is a greater dietary diversity than among males and non-reproductively active females. Major prey includes moths, caddisflies, flies, mosquitoes, and midges. Other prey includes bees, wasps, flying ants, beetles, leafhoppers, treehoppers, stoneflies, and lacewings.

3.1.6 Status. The Indiana bat is Federally endangered throughout its range and was listed as such in the Federal Register, March 11, 1967. The known Indiana bat population is estimated at 353,000 bats (based on census data taken at hibernacula) which is a decline in the population of about 60 percent since the 1960s. Table 3.2 provides a summary of the known hibernating Indiana bat populations by State. Two states show the most severe decline in Indiana bat populations, Kentucky and Missouri, where 180,000 bats were lost between 1960–1997, and 250,000 bats were lost during 1980–1997, respectively.

TABLE 3.2. SUMMARY OF HIBERNATING INDIANA BAT POPULATIONS BY STATE

State	Estimated Population		
	Historic Level (1960 or Earliest No.)	When Regular Surveys Began (-1980)	Most Recent Survey (1995-1997)
Alabama	300	300	300
Arkansas	14,930	14,830	2,700
Illinois	4,140	3,990	4,530
Indiana	177,885	124,080	182,510
Kentucky	241,335	96,235	61,370
Missouri	323,120	302,915	47,135
New York	7,805	7,805	14,990
Ohio	--	--	9,300
Pennsylvania	65	65	270
Tennessee	19,305	19,305	16,580
Virginia	5,620	5,620	1,840
West Virginia	4,700	4,675	11,660
Total	808,505	589,120	353,185

Source: U.S. Fish and Wildlife Service, 1999.

The population in Indiana appeared to decline through 1980 but has since shown a steady increase in numbers. Approximately 182,000 (about one-half of the total Indiana bat population) is located in Indiana.

3.1.7 Reason for Decline. Several documented causes can be attributed to the decline in populations of Indiana bats. However, according to the U.S. Fish and Wildlife Service, the known factors do not appear to account for the current rate of decline. Known disturbances that have resulted in a decline in the population include disturbance and vandalism, improper cave gates and structures, and natural hazards.

Disturbance of the bats during hibernation can result in as much as a 68-day expenditure of fat per occurrence. Recreational cavers and individuals passing near cave entrances can arouse bats. Too many occurrences can result in an excessive exhaustion of fat before the bats are able to replenish it during spring foraging. This can result in high mortality during the spring migrations. Vandalism, including the shooting and killing of large numbers of bats at hibernation sites, has been recorded.

Improper gate structures at cave entrances have rendered several caves unavailable for hibernation. In some instances, structures that do allow access have altered the air flow and temperature at a hibernaculum such that hibernating bats were not able to survive the winter as the increase in temperatures resulted in an increase in the metabolic rate resulting in premature exhaustion of fat reserves (USFWS, 1999). It should be noted that in areas where bat activity has been altered due to gates, etc., the installation of bat-friendly gates has resulted in re-establishment of the area as a hibernaculum, and population increases have been noted in some areas. Flooding, caving of mine ceilings, and freezes are among the natural hazards that have contributed to population declines.

Land use practices (fragmentation and loss of roosting and foraging habitat), and the use of pesticides are other suspected causes of population declines, however sufficient data does not exist to make a definitive statement.

3.2 Bald Eagle (*Haliaeetus leucocephalus*)

3.2.1 Species Description. The bald eagle is a large raptor. Adult males average 33 inches from head to tail, weigh up to 8.5 pounds, and have a wingspan of approximately 6.75 feet. Females are larger averaging 36 inches long and weighing 11 pounds, and have a wingspan of approximately 7.25 feet. The adults are dark brown with a distinctive white head and tail feathers. They have large pale eyes, a powerful yellow beak, black talons, and featherless yellow feet. Immature eagles are generally darker and have a dusky head and tail. They have a dark beak and mottled white under the wings and base of tail.

Eaglets are pale yellowish white or smoke gray with a pale head and lower parts and a dull white throat. By their first winter, the juvenile eagles are brown and mottled with pale brown or brownish white. As the eagle matures in four to five years, its head and tail become whiter. It may take up to nine years for the tail to become completely white (Oberholser 1974).

3.2.2 Taxonomic Status. The bald eagle belongs to the order Falconiformes, which contains vultures and diurnal birds of prey, and the family Accipitridae. Originally described as *Falco leucocephalus* by Linnaeus in *Systema Naturae*, 1766, the bald eagle was later renamed *Haliaetus leucocephalus* by Boie in *Isis*, 1882. The genus, later re-spelled as *Haliaeetus*, is derived from the Greek word *haliaetos* meaning "sea eagle," and the specific epithet, *leucocephalus*, meaning "white-headed."

3.2.3 Geographic Range. The bald eagle occurs over most of North America, from the northern reaches of Alaska and Canada to northeast Labrador, to the northern parts of Mexico and south to Baja California, Texas, the Gulf States, and Florida. Populations are much reduced over most of its range, but it is still common in coastal Alaska, British Columbia, and in lesser numbers, Florida. Although bald eagles may range over great distances, they usually return to nest within 100 miles of where they were raised.

In 1974, a nationwide bald eagle survey was conducted by the U.S. Fish and Wildlife Service, state agencies, and conservation groups to show population and reproduction success. They concluded that bald eagle populations and reproductive success were lower in he northern half of the 48 states than the southern areas (Federal Register, 1995).

3.2.4 Habitat. The bald eagle is a bird of aquatic ecosystems. They are found in associations with quiet coastal areas, estuaries, rivers, lakes, and reservoirs. Bald eagles build large stick nests lined with softer material such as leaves, moss, and grass. The same pair of eagles reuses a nest year after year. Tall trees or cliff edges are needed to support their large nest platforms, which may measure six feet in diameter and weigh hundreds of pounds.

During the winter, bald eagles congregate at specific wintering sites. They generally prefer open water areas that offer good perch trees and night roost (Federal Register, 1995). Currently, major threats to the bald eagle are destruction and degradation of its habitat and environmental contaminants.

3.2.5 Life History. Adult plumage is not acquired on bald eagles until four years of age at a minimum. Prior to obtaining adult plumage, bald eagles go through a series of plumages, some of which superficially resemble the golden eagle (*Aquila chrysaetos*). Sexual maturity is reached at four to six years with first breeding sometimes occurring later than this. The reasonable potential life span of a bald eagle is approximately 30 years under natural conditions. However, mortality is thought to be high in the immature age classes, with many birds probably not reaching sexual maturity and few likely to live to 30 years.

Nesting bald eagles are almost exclusively found near rivers, lakes or sea coasts (USFWS, 1983). Adult bald eagles generally use the same breeding areas and nests each year. Nest sites are primarily trees and cliffs with bald eagles rarely nesting on the ground. Bald eagle clutches include one to three eggs with successful pairs usually raising one or two young per nesting attempt. Egg laying usually occurs from November (Florida) to May (Alaska) with varying times being largely dependent on latitude. The period between egg laying and fledging is approximately four months.

Most bald eagles move south during the winter months (wintering period) as weather conditions and food availability change.

During the wintering period bald eagles are generally found near open water feeding on fish and waterfowl (dead or crippled). These eagles usually congregate at commercial roost trees at night and may range up to 20 kilometers from feeding areas to a roost site. It is suspected that bald eagles utilize commercial roost sites as they help minimize the energy stress encountered by wintering eagles, facilitates food finding, and provides isolation from human disturbance.

3.2.6 Status. It is estimated that there may have been as many as 25,000 to 75,000 nesting bald eagles in the lower 48 states in 1782. Since that time the bald eagle has suffered from habitat destruction, illegal shootings, and contamination from pesticides. In 1940 the eagle was protected through the establishment of the Bald Eagle Protection Act, which made it illegal to kill, harass, possess or sell bald eagles. The bald eagle was first listed as Federally endangered on March 11, 1967 (under a law, which preceded the Endangered Species Act). The species was classified as Federally endangered in 43 of the 48 contiguous United States in 1978.

3.2.7 Reasons for Decline. The bald eagle was subjected to illegal shootings as they, along with other raptors, were perceived by many as threats to domestic livestock. Loss of habitat also contributed to the decline of this species. As stated above, an act was passed providing protection to the bald eagle, however, species declines were still noted. This continued decline coincided with the introduction and widespread use of the insecticide dichloro-diphenyltrichloroethane (DDT) in 1947,

and other organochlorine compounds. DDT runoff into rivers, lakes, etc., was absorbed by aquatic plants and small aquatic animals, which in turn contaminated fish (one of the eagle's primary food source). This chemical would accumulate in the fatty tissues of eagle prey and once ingested by eagles, adversely affected reproduction. Bald eagles contaminated with high levels of the DDT either no longer laid eggs or laid eggs with weak or thin shells that broke during the incubation period. Habitat loss associated with development and other land clearing activities has also contributed to the historic decline in the bald eagle populations.

3.3 Fat Pocketbook Mussel (*Potamilus capax*)

3.3.1 Species Description. The shell of the fat pocketbook mussel is round to somewhat oblong, thin (young) to relatively thick (adults), with the anterior and posterior ends rounded. The umbo (oldest part of the bivalved shell readily identified as the raised parts on the dorsal margin of each of the shell valves, and sometimes referred to as the beak) is greatly inflated, elevated and turned inward. The beak sculpture has faint ridges, which are mostly visible in the younger shells only. The beak cavity is very deep and large. The periostracum (thin external layer composed of protein surrounding most mollusk shells) is smooth, yellow to brown in color with narrow yellow bands sometimes present parallel to the growth lines. The average length of the shells is approximately five inches.

The nacre (inner layer of the shell) is bluish-white to occasionally pink inside the pallial line and often has an iridescent bluish border. Pseudocardinal teeth (two in each valve) are thin compressed and elevated. Lateral teeth (two in the left valve and one in the right valve) are thin and very curved. The fat pocketbook mussel is not sexually dimorphic. The fat pocketbook mussel resembles the more common *Lampsilis ovata* and can be distinguished by the yellow-brown periostracum, absence of rays, and the lack of sexual dimorphism.

3.3.2 Taxonomic Status. The fat pocketbook mussel is in the phylum Mollusca, class Bivalvia, order Unionoida, and family Unionidae. This species was first described as *Unio capax* in 1832, and as *Symphynota globosa* in the same year. It was then moved to the genus *Proptera* where it remained for approximately 50 years. The genus *Proptera* was described in 1819, however the same genus had been described earlier in 1818 as *Potamilus*. Today, those malacologists who prefer the rule of priority refer to this species as *Potamilus capax* whereas those preferring the "50 year rule" use the genus *Proptera*.

3.3.3 Geographic Range. The fat pocketbook mussel inhabits waterways ranging from main channels of large rivers to small ditches in portions of Arkansas, Illinois, Indiana, Kentucky, Louisiana, Missouri, Mississippi, New York, and Texas. Its presence in the vicinity of the project area has been documented in the Wabash River in Indiana, and also in the Ohio River in Illinois. It has also been reported in portions of the upper and lower Illinois River in Illinois, and in small populations within the mainstream of the Mississippi River from Wabash, Minnesota, to Grafton, Illinois.

3.3.4 Habitat. Generally, these mussels can be found in slow to medium flowing streams (the majority of which are approximately eight feet deep) with mud, sand, or gravel bottoms. Nothing is known about the specific requirements for adults or any other life stage.

3.3.5 Life History. The majority of the adult mussels remain entrenched in their environment throughout their lives. Shells remain partially to totally buried in the substrate, with the shells

partially open to allow the intake of nutrients, and the excretion of wastes. The foot serves as the anchor for the mussel. The females have larger shells than do the males to accommodate the young during the embryonic stage. Fat pocketbook mussels reproduce similar to that of other freshwater mussels. Spawning generally occurs in the summer with the glochida (larvae) retained through the fall and winter, and released during the late spring and early summer. Males discharge sperm into the water column, which is taken in by the females during a process known as siphoning. The eggs are fertilized in the gills and remain through embryo development into the larvae stage. The larvae, which are obligate parasites on gills or fins of freshwater fishes, are then released and must attach to a host in order to survive. Once released, no other parental care is given. These larvae are generally not visible on the host but may appear as small white dots attached to gills, fins, or other external surfaces on a fish. The larvae remain on the fish from one to six weeks during which time they do not grow noticeably and are apparently harmless to the host. Upon reaching the juvenile stage, they detach from the host and fall to the bottom becoming independent mussels.

These mussels are generally sedentary; therefore all life history processes including reproduction generally takes place in the same environment. However, these mussels have been known to move voluntarily to avoid drying, high temperatures, or other life-threatening conditions.

3.3.6 Status. The fat pocketbook mussel was first listed as endangered on June 14, 1976. This species is also protected under the Lacy Act (P.L. 97-79, as amended; 16 U.S.C. 3371 *et seq.* The historic population was estimated at 11,000 to 24,000 individuals, however recent surveys show that this species only comprises approximately one percent of the total mussel population.

A qualitative unionid dive survey was performed upstream and downstream of J.T. Myers Locks and Dam during June 1999. Relatively few unionids were identified. As the fat pocketbook mussel is known to occur near J.T. Myers Locks and Dam, considerable effort was expended to ascertain if this species and preferred habitat of this species occurs within areas that could be possibly impacted by the 600-ft lock chamber modification. The unionid survey did not recover any *P. capax* specimens and few, if any, areas that may be preferred habitat for this species. One area that may contain preferred habitat was located just upstream of the mouth of the Wabash River near the right descending bank. An area near the mouth of the Wabash River and situated approximately mid-channel of the Ohio River did harbor a few live unionids, however, a "unionid bed" was not observed at this location.

3.3.7 Reasons for Decline. The reason for decline has been largely attributed to loss or significant impacts to habitat. The most significant impact on the habitat is associated with navigational and flood control activities, channalization, and dredging operations. Other conditions associated with these activities, which can be attributed to declines in populations, include alteration of the oxygen levels in the water, increased siltation, altered flow patterns, and manipulation of the species composition among fishes which may impact reproduction. Water pollution is an expected cause of species decline, but there is not sufficient documentation of non-point source pollution impacts to list this as a definitive cause.

4.0 POTENTIAL CONSEQUENCES

4.1 Construction

4.1.1 Indiana Bat. Construction would include an access road, which would traverse an existing open prairie, and dredging associated with the proposed project. No preferred Indiana bat habitat would be impacted during the construction phase of the proposed project.

4.1.2 Bald Eagle. Construction would include the construction of an access road, which would traverse an existing open prairie, and dredging associated with the proposed project. Some potential bald eagle foraging habitat may be affected (increased sedimentation during construction, and alteration of the riparian habitat associated with bank shaving) during the construction phase of the proposed project. However, these impacts would be temporal and are not considered significant as sufficient foraging habitat exists adjacent to the proposed construction areas.

Fat Pocketbook Mussel. No fat pocketbook mussels were observed during the unionid survey. Direct impacts from physical modifications of the streambed and bank will occur at least one mile (to a mile and a half) upstream of areas found to harbor a few live unionids and possible *P. copax* favorable habitat. Indirectly, in-stream sediment load from run-off and in-stream modifications may increase during construction activities; however, much of this can be mitigated through the proper use of cofferdams and sediment barriers. During moderate and high flow conditions, river flow will also decrease sediment deposition immediately downstream of the construction area. The proposed project construction should have no effect on fat pocketbook mussels and is not likely to adversely affect fat pocketbook mussel habitat. The unionid survey data indicate that dredging near the existing 600-ft lock chamber and excavating the existing bank downstream to approximately Ohio River Mile 847.0 should not significantly impact unionid populations within the area.

4.1 On-Site Disposal of Dredge Material

4.2.1 Indiana Bat. On-site disposal would require the temporary loss of approximately 20.4 acres of prairie, 63.6 acres of frequently maintained openland and approximately ten acres of scrub shrub habitat. Both of these communities are adjacent or near the water, and may be used in the spring and summer as foraging habitat. It is not likely that the entire open area would be impacted simultaneously, and sufficient foraging habitat would remain during the project construction. As these areas would be restored to pre-project conditions upon completion of the project, no adverse affects to the Indiana bat or habitat are expected.

The proposed project would require an approximately 100-foot-wide area landward from the Ohio River along the right descending bank downstream approximately 0.5 miles to be removed to allow for barge alignment with the new lock extension. Currently this area is dominated by black willow (*Salix nigra*) along the first shelf of the riverbank, transitioning to a silver maple (*Acer saccharinum*) stand. The majority of the potential roost trees are present landward of the river, especially in the vicinity of Little Pitcher Lake. The clearing associated with this phase of the project is considered minor, and if it is performed outside of the summer occupancy period (April 15–September 15), there would likely be no adverse affects to the Indiana bat, or its preferred habitat.

4.2.2 Bald Eagle. The area targeted for on-site disposal of dredge material associated with the proposed project does not contain bald eagle nesting, or roosting habitat and therefore would not affect bald eagles.

4.2.3 Fat Pocketbook Mussel. No fat pocketbook mussel habitat exists at this proposed disposal site. Therefore, the proposed disposal of dredge material would not affect the fat pocketbook mussel.

4.3 Off-Site Disposal On State Owned Lands

4.3.1 Indiana Bat. This area is currently maintained for crop production and may be used for foraging by the Indiana bat in the spring and summer. Under the contemporary design and the beneficial use of the dredge material design, the area would remain open and could continue to be used for foraging. Off-site disposal of dredge material would not likely effect the Indiana bat or its preferred habitat.

4.3.2 Bald Eagle. The proposed site is adjacent to the Hovey Lake Wildlife Management Area and is currently being used for crop production. One bald eagle nest is approximately 0.8 miles from the proposed site. The contemporary disposal design and beneficial use of the dredge material would not alter any bald eagle nesting or roosting habitat, and therefore would not affect bald eagles or their preferred habitat.

4.3.3 Fat Pocketbook Mussel. No fat pocketbook mussel habitat exists at this proposed disposal site. Therefore, the proposed disposal of dredge material (contemporary or beneficial use design) would not affect the fat pocketbook mussel.

4.4 Off-Site Disposal On Privately Owned Land

4.4.1 Indiana Bat. The area targeted for disposal is currently used for crop production. It is openland and surrounded by mature bottomland hardwoods, which contain potential Indiana bat summer nesting and roosting habitat. The proposed disposal area may be used for foraging by Indiana bats during the spring and summer. Under the contemporary design, the area would remain croplands and could continue to be used for foraging. Therefore, under this scenario, no affects to the Indiana bat are expected.

Under the beneficial use of the dredge material design, the area would be replanted in bottomland hardwoods thereby reducing forest fragmentation in the area (a suspected cause of species decline) and provide future summer nesting and roosting habitat for the Indiana bat. There is sufficient open agriculture land in the area to offset any foraging habitat for the Indiana bat. This scenario is expected to have a beneficial affect on the Indiana bat.

4.4.2 Bald Eagle. The proposed site is southwest of the Hovey Lake Wildlife Management Area and is currently being used for crop production. One bald eagle nest is approximately three miles from the proposed site. The contemporary disposal design and beneficial use of the dredge material would not alter any bald eagle nesting or roosting habitat, and therefore would not affect bald eagles or their preferred habitat.

4.4.3 Fat Pocketbook Mussel. No fat pocketbook mussel habitat exists at this proposed disposal site. Therefore, the proposed disposal of dredge material (contemporary or beneficial use design) would not affect the fat pocketbook mussel.

4.5 No-Action. Under the no-action alternative no adverse impacts to the Indiana bat, bald eagle or the fat pocketbook mussel or their preferred habitat would likely occur.

5.0 SUMMARY AND CONCLUSIONS

There are no known Indiana bat populations or bald eagle nests located on any of the proposed disposal sites, however potential habitats for the bald eagle and Indiana bat are present on the site adjacent to the locks and dam, particularly around Little Pitcher Lake. Little Pitcher Lake is located north of any proposed on-site disposal areas.

Both of the proposed off-site disposal areas contain open grassland that may possibly be used for foraging in the spring and summer by Indiana bats. Under both of the alternative disposal designs these areas would remain open and could continue to be used for foraging with the exception of the off-site private property disposal site. This area would be restored to a bottomland hardwood community under the beneficial use design and would provide future roosting and nesting habitat for the Indiana bat.

On-site disposal would not likely affect the bald eagle, or the fat pocketbook mussel. Assuming that the land clearing would be performed outside of the summer occupancy period (April 15–September 15), there would likely be no adverse affects to the Indiana bat or its preferred habitat.

Off-site disposal on State-owned or private lands would not likely affect the Indiana bat, the bald eagle, or the fat pocketbook mussel. Further, beneficial affects for the Indiana bat could occur under the beneficial use of dredge material design on the private lands.

Construction would include dredging approximately 500,000 cubic yards of material from the Ohio River, and removing an approximate 100' by 1,000' section of the right descending bank below the J.T. Myers Locks and Dam. A qualitative unionid dive survey was performed upstream and downstream of J.T. Myers Locks and Dam during June 1999. Relatively few unionids were identified. Considerable effort was expended to ascertain if the fat pocketbook mussel and preferred habitat of this species occurs within areas that would be possibly impacted by the 600-foot lock chamber modification. The unionid survey did not recover any *P. capax* specimens and few, if any, areas that may be preferred habitat for this species. One area that may contain preferred habitat was located just upstream of the mouth of the Wabash River near the right descending bank. An area near the mouth of the Wabash River and situated approximately mid-channel of the Ohio River did harbor a few live unionids, however, a "unionid bed" was not observed at this location. The unionid survey data indicate that dredgine near the existing 600-foot lock chamber and excavating the existing bank downstream to approximately Ohio River Mile 847.0 should not significantly impact unionid populations within the area.

No preferred Indiana bat habitat would be adversely affected during the construction phase of the project. Some potential bald eagle foraging habitat may be affected (increased sedimentation during construction, and alteration of the riparian habitat associated with bank shaving) during the construction phase of the proposed project. However, these impacts would be temporal and are not considered significant as sufficient foraging habitat exists adjacent to the proposed construction areas to affect these temporary impacts.

Under the no-action alternative, no construction and dredging would occur associated with lock expansion activities. Therefore, no adverse impacts to the Indiana bat, bald eagle, or the fat pocketbook mussel would likely occur.

If additional data becomes available that would contradict the results contained herein, or if the proposed project is significantly altered, it may be necessary to reevaluate species impacts.

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7.0 FIGURES

This section includes all figures referenced throughout the text. These figures are numbered to correspond with the appropriate text references.

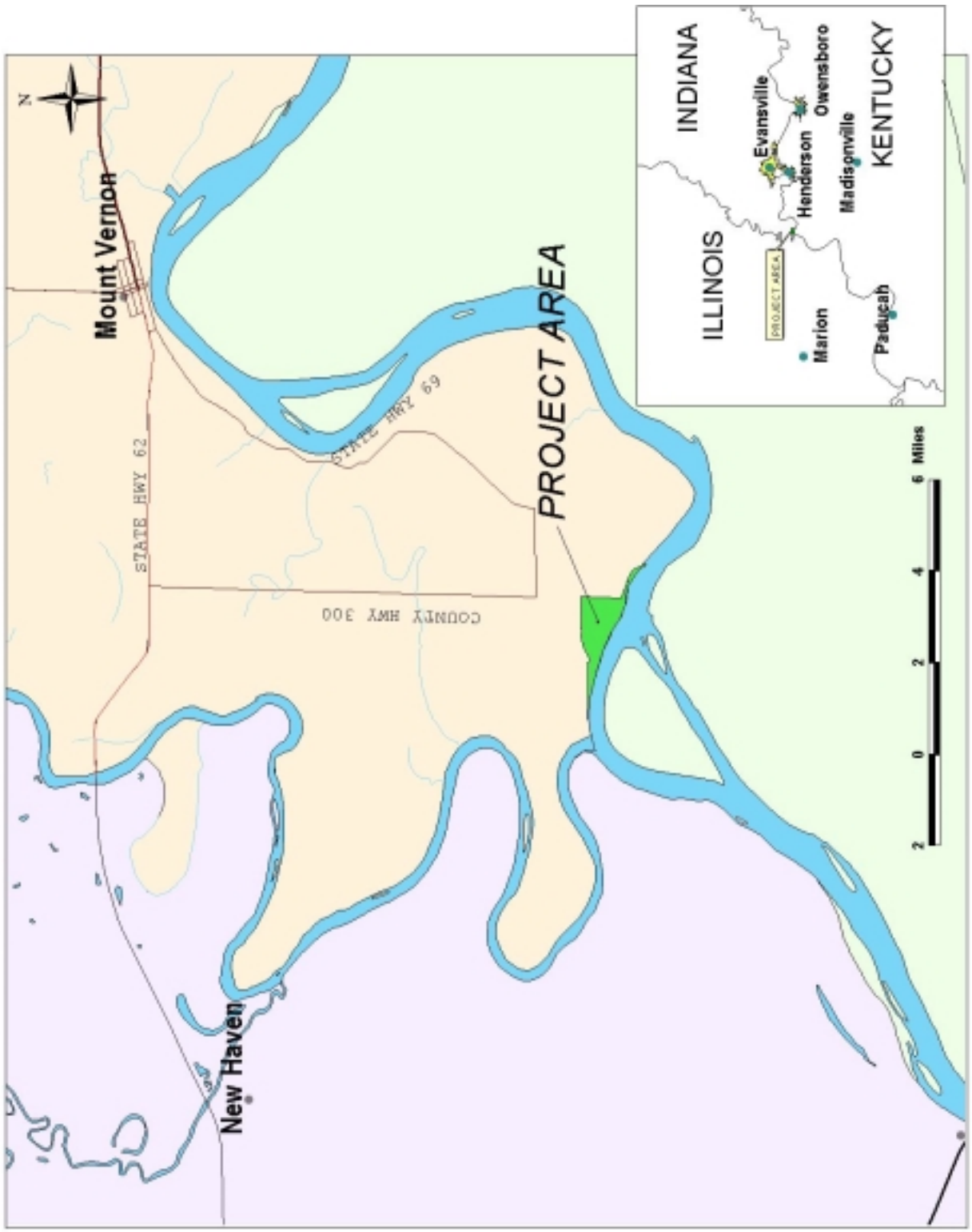

Figure 1. Location of J.T. Myers Locks and Dam

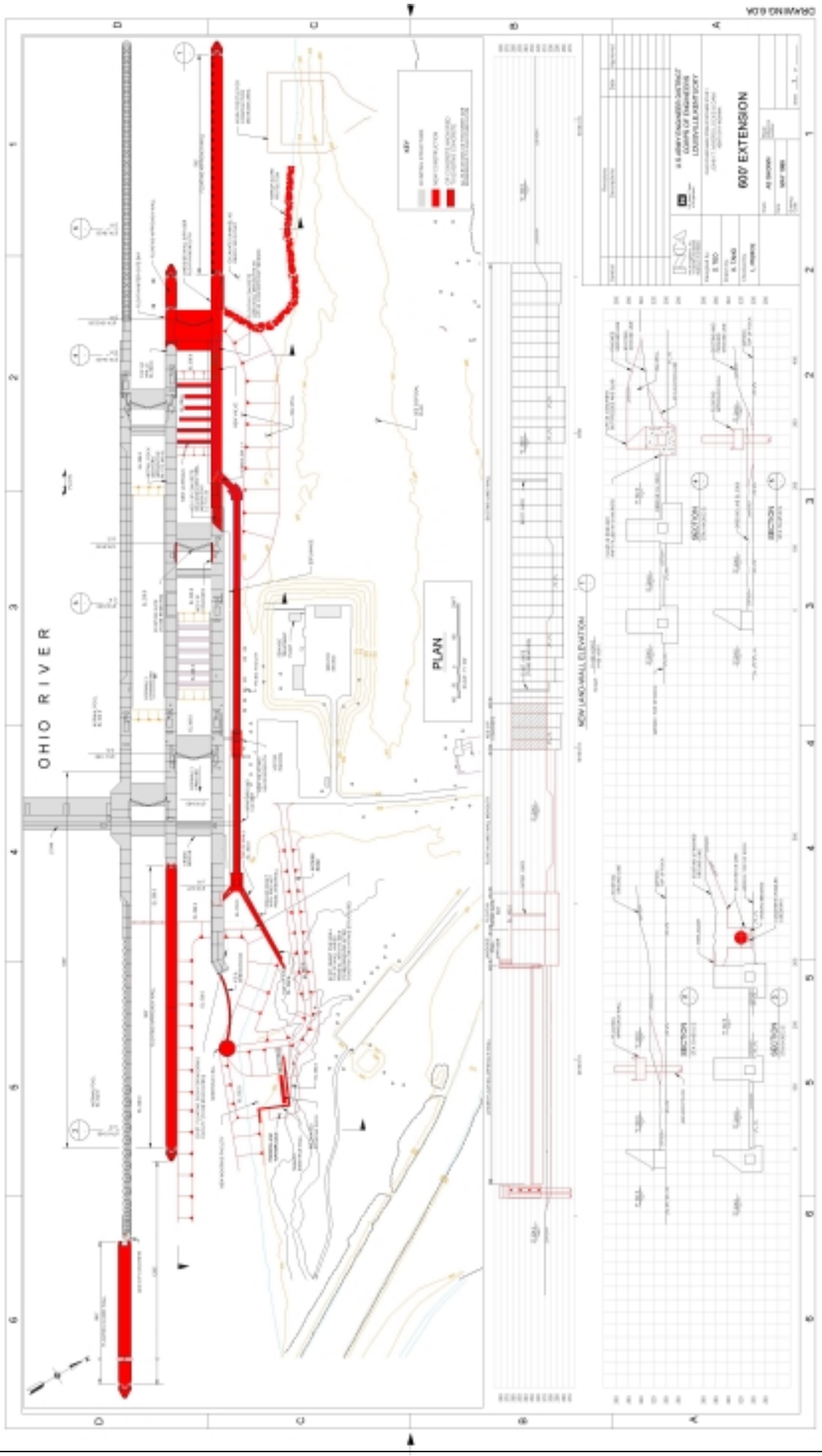

FIGURE 2. Project Construction Plan View

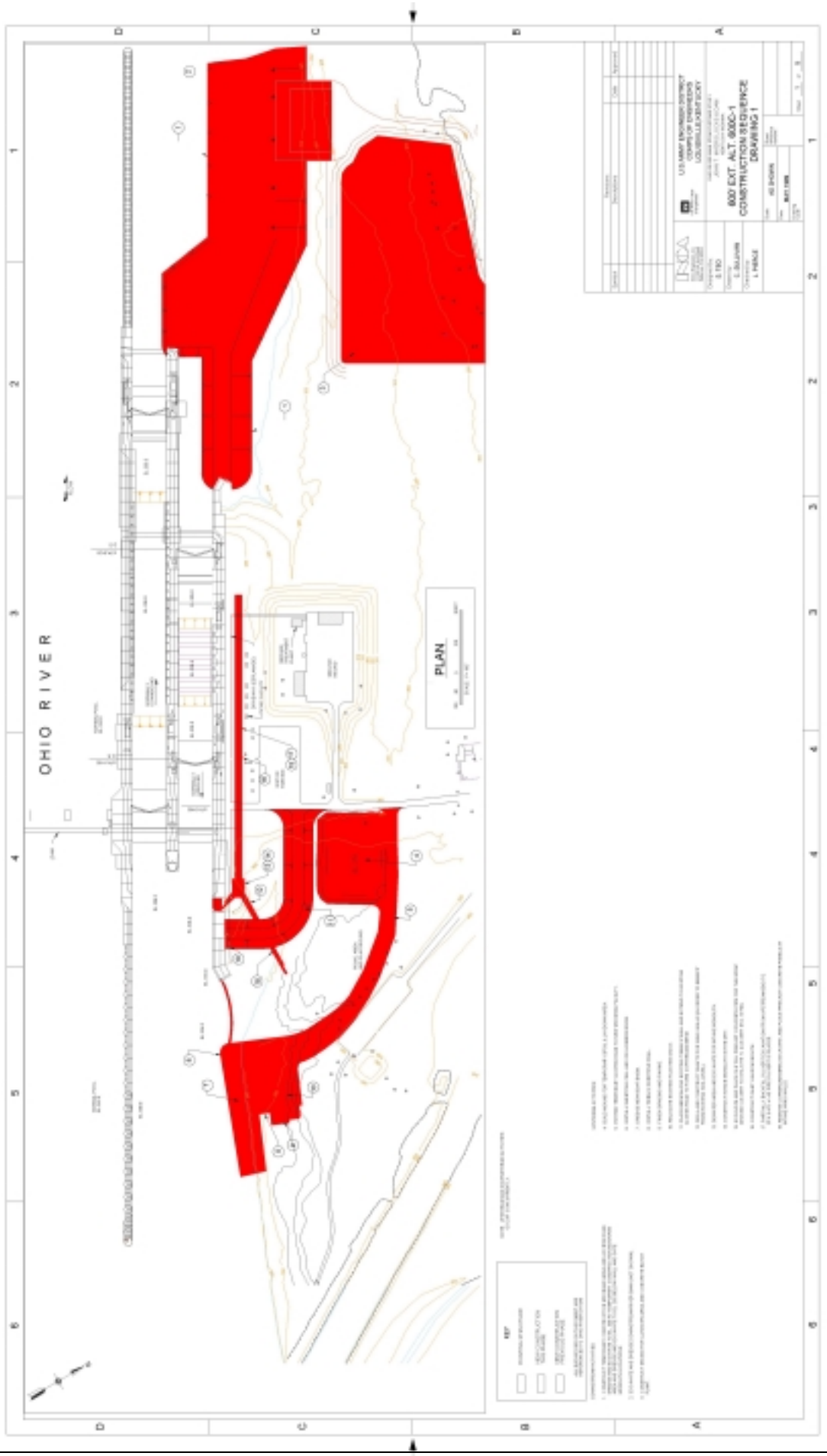

FIGURE 3. Construction Sequence (Sheet 1 of 5)

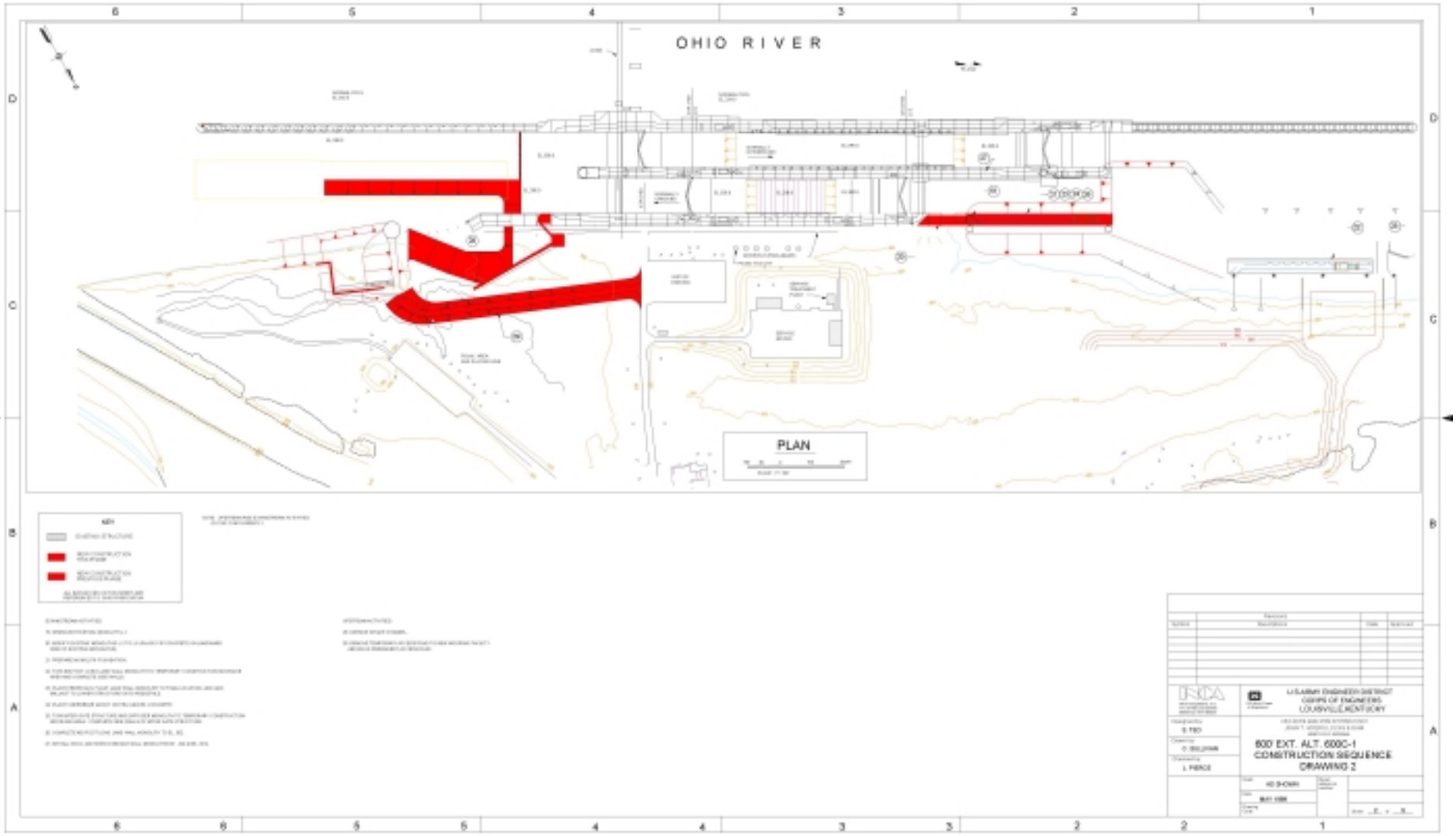

FIGURE 4. Construction Sequence (Sheet 2 of 5)

FIGURE 5. Construction Sequence (Sheet 3 of 5)

FIGURE 6. Construction Sequence (Sheet 4 of 5)

FIGURE 7. Construction Sequence (Sheet 5 of 5)

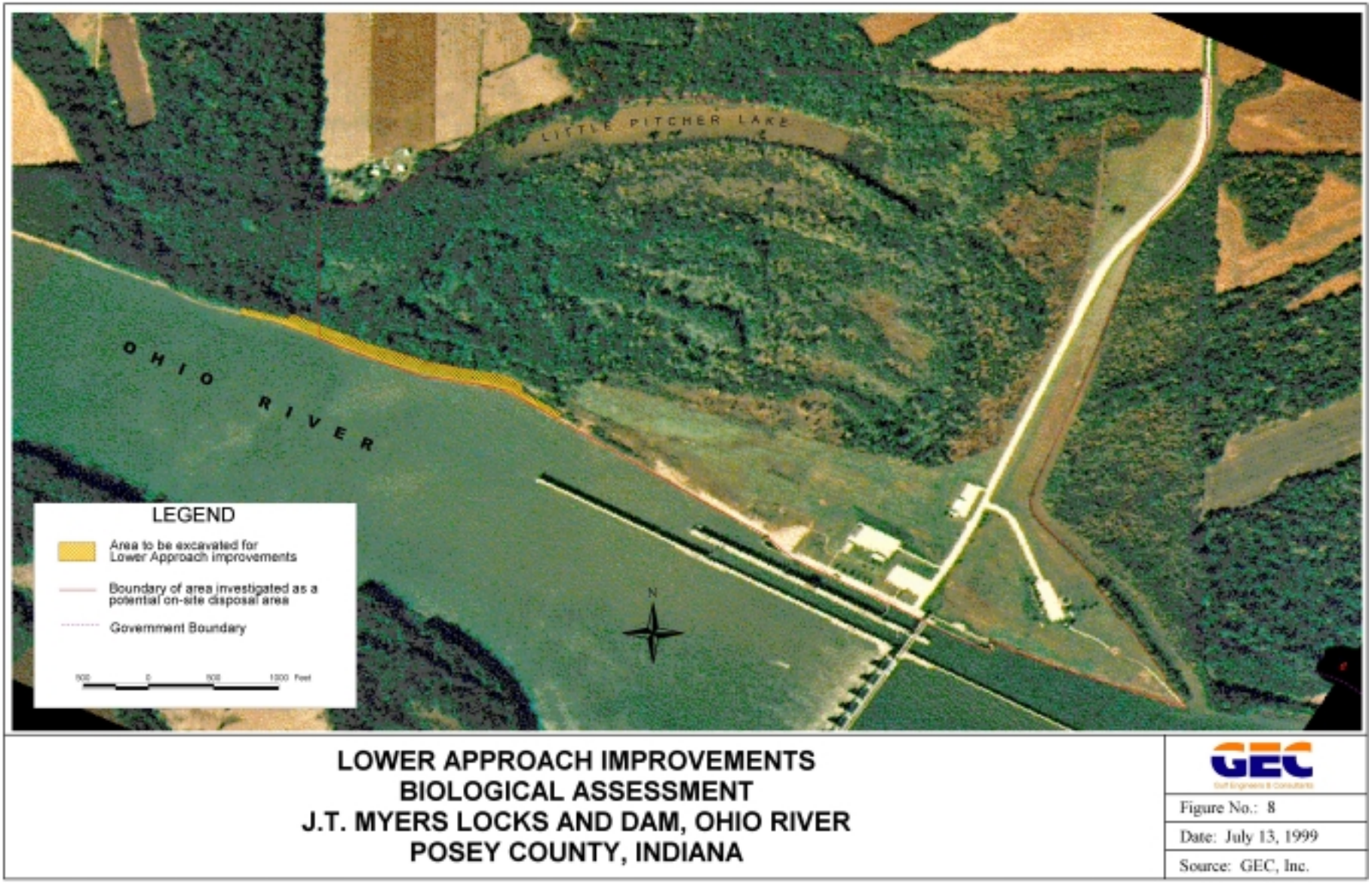

FIGURE 8. Lower Approach Improvements

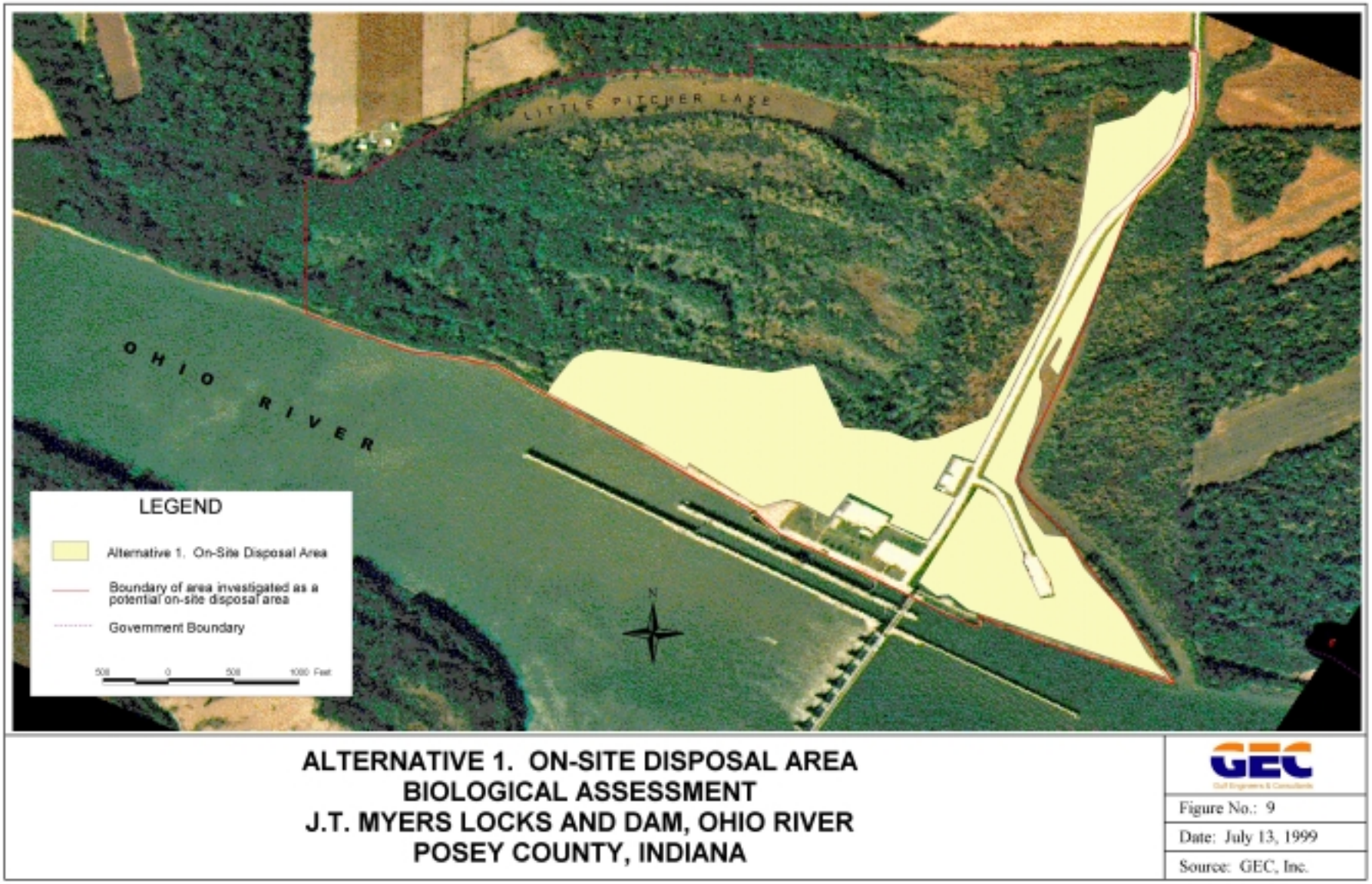

FIGURE 9. Alternative 1. On-Site Disposal Area

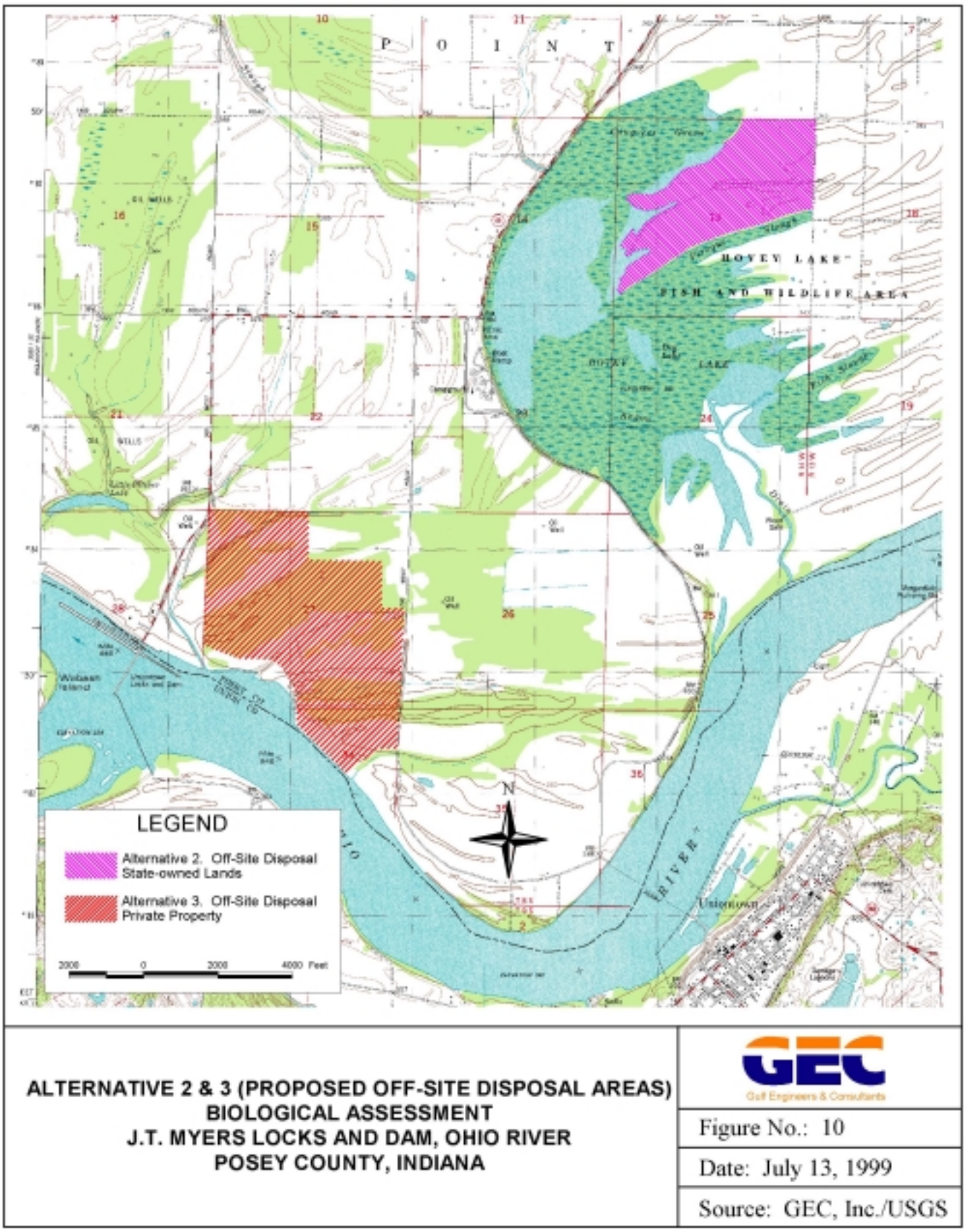

FIGURE 10. Alternative 2 and 3 (Proposed Off-Site Disposal Areas)

APPENDIX D

CLEAN WATER ACT: SECTION 404 (b)(1)

GREENUP EVALUATION

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SECTION 404(b)(1) EVALUATION
GREENUP LOCK & DAM IMPROVEMENT PROJECT
GREENUP COUNTY, KENTUCKY

This report concerning the proposed modification of Greenup Lock & Dam, Greenup County, Kentucky is submitted in accordance with Section 404 of the Clean Water Act of 1977 (Public Law 95-217).

I. PROJECT DESCRIPTION.

A. Location. The project is located within the channel of the Ohio River 341 miles below Pittsburgh, Pennsylvania, 5 mile below the town of Greenup, Kentucky. The 166 acre site, including staging areas, is presently developed for the existing project and park lands.

B. Description of Proposed Work. The proposed action is to modify the Greenup Lock & Dam so that it will service Ohio River navigation needs for the years 2010-2060. Three structural alternatives are considered to address the need for reliable navigation service through the extension of the auxiliary lock chamber. Any of these proposed modifications would allow the authorized purposes of Greenup Locks & Dam to continue at a level that meets industry demand during scheduled maintenance outages during the period specified. The proposed modifications are summarized as follows:

- **Plan 3—With Culvert**. This alternative involves extending the auxiliary lock chamber 600 feet and modify the fill/empty system of the chamber to provide a level of service comparable to the existing main chamber. Additional actions include the extension of certain landing walls and improvement of approach conditions.

- **Plan 4—Future/Phased.** This alternative is identical to plan 2 above in that the wall and auxiliary chamber extensions and the emptying system improvements would be constructed in the near-term. The future augmentation of the auxiliary filling system however, would be authorized and planned under this alternative. Construction of these improvements to the auxiliary filling system would be pursued when traffic/maintenance scenarios justify the expenditure.
- **No-Action.** Make no structural provisions to accommodate river traffic during expected maintenance outages. Notices to industry would allow diversion of some time-sensitive commodities, however economic losses to the national economy would be expected.

The project involves the placement of fill in waters of the United States regardless of the action alternative selected. The three action alternatives require placement of concrete, rubble and fine sediments in and around the foundations of the extended walls; the placement of material along the shoreline required for bank stabilization; and the placement of rubble for environmental mitigation features as described in the Environmental Impact Statement for the project.

Waters of the United States effected by this activity include the Ohio River. Approximately 115,000 cu. yds. of material would be placed in the waters of the United States for each alternative proposed.

Authority and Purpose. The Greenup Project was authorized by the River and Harbor Act of March 3, 1909. Investigations of the project pursued under the Ohio River Mainstem System Study is authorized by the resolution adopted by the Committee on Public Workd of the U.S. Senate, dated May 16, 1955. Further authorization was given by a resolution adopted by the U.S. House of Representatives Committee on Public Works and Transportation dated March 11, 1982.

D. Description of Material.

1. General Characteristics of Proposed Fill Material. 15,000 cu. yds. of clean earth and rock; and 100,000 cu. yds. Rock & Concrete rubble.

2. Source of Material. Concrete will be removed from the existing structure during demolition, rock and earth will be removed during development of wall foundations and lateral culvert excavation.

E. Description of Proposed Discharge.

1. Location. Clean earth and rock of suitable size will be placed beneath the extended landing walls when complete. Rubble suitable for environmental mitigation would be placed at locations adjacent to the project, outside of the navigation channel. Details are available in the Greenup L&D, Site Engineering Appendix, Myers L&D and Greenup Lock Improvments – Interim Feasibility Report.

2. Size.

3. Type of Disposal Site and Habitat. The area directly affected by the proposed fill is open water riverine

habitat. Much of the area is a uniform sand substrate with few structural features. No sensitive aquatic habitats would receive fill under these proposed plans.

4. Timing and Duration of Discharge. The proposed construction work is expected to require approximately 2.5 years overall. Fill would be placed throughout this period.

F. Description of Disposal Method. Fine grained sediments would be placed by hydraulic dredge. Rubble and coarse fragments would be placed using clam-shell dredges or other appropriate equipment.

II. FACTUAL DETERMINATIONS.

A. Physical Substrate Determinations.

1. Substrate Elevation and Slope. No changes are expected.

2. Substrate Type. The existing substrate is primarily sand. Finer sediments have also accumulated on these materials over time.

3. Dredged/Fill Material Movement. No movement of fill materials is expected to occur.

4. Physical Effects on Benthos. Existing in-situ benthic populations would be lost or displaced during removal/placement activities. Habitats for benthic populations would then be expected to recolonize the proposed fill as no degradation is expected long-term.

5. Other Effects. Local and temporary increases in turbidity may occur during construction. Precautions would be taken to reduce the effects of these suspended sediments on the Ohio River. The Environmental Impact Statement outlines these precautions in detail.

No other effects are known. Cultural/historical artifacts are not expected to be present within this formerly excavated feature.

6. Actions Taken to Minimize Impacts. Refer to Section 5.0 of the Environmental Impact Statement for a detailed discussion of the potential impacts of project activities and their attendant mitigation actions.

B. Water Circulation, Fluctuation and Salinity Determinations.

1. Water.

a. Salinity. Not applicable.

b. Water Chemistry. During major storm events, run-off from the construction site, and dewatering activities may introduce suspended solids (primarily sediments) into the stream. Precautions would be taken to reduce the quantity of suspended sediments entering the Ohio River.

2. Clarity. Only short-term increases in turbidity are expected. To minimize erosion at land-based construction support areas, construction staging, soils stabilization and detention facilities would be employed as necessary to reduce turbidity. In the interim, standard measures to prevent introduction of sediment and other materials to the river will be taken.

C. Color. No effect.

D. Odor. No effect.

E. Taste. No effect.

F. Dissolved Gas Levels. No effect.

G. Nutrients. No effect.

H. Eutrophication. No effect.

I. Other as Appropriate. No others identified. Temporary increases in turbidity due to construction activities may be expected in the immediate vicinity.

1. Current Patterns and Circulation.

a. Current Patterns and Flow. Normal water circulation within the Ohio River would not be impeded by any of the proposed measures.

b. Velocity. Normal water velocity would not be impeded by the proposed project.

c. Stratification. Not applicable.

d. Hydrologic Regime. No significant changes.

2. Normal Water Level Fluctuations. No effect.

3. Salinity Gradients. Not applicable.

4. Actions that will be taken to minimize impacts. Appropriate measures have been identified and incorporated in the proposed plan to minimize adverse effects of the project on the aquatic environment. In addition to the placement of random rock materials, these measures include minimizing work in the waterway, containment of erosion-prone areas, proper design and construction, use of environmentally acceptable fill materials, and revegetation of exposed soils.

J. Suspended Particulate/Turbidity Determinations.

1. Expected changes in suspended particulates and turbidity levels in the vicinity of disposal site. Fill materials consist of concrete. Additions are not expected to create significant turbidity or sedimentation.

2. Effects on chemical and physical properties of the water column.

a. Light Penetration. See II.B(2). Minor reduction will occur at times during the construction period due to turbidity.

b. Dissolved Oxygen. No Impact.

c. Toxic Metals and Organics. The fill materials will be relatively inert and are not expected to contribute to water quality degradation.

d. Pathogens. See II.J.2.(c), immediately above.

e. Aesthetics. Although the fill area may have an artificial appearance, this immediate reach of the river is fully developed. Landscaping and plantings associated with the new facility should result in a return to the original aesthetic values of the area.

3. Effects on Biota.

a. Primary Production, Photosynthesis. The proposed fill would not eliminate the aquatic environment. Modifications are not expected to have a lasting affect on primary production and photosynthesis in any subaqueous community.

b. Suspension/Filter Feeders. Species of this trophic level (benthos) within the construction zone would be dislocated or lost. Losses would not be permanent and not significant for the Ohio River system.

c. Sight Feeders. Sight feeders may be temporarily affected by increased turbidity levels but due to expected short duration of these impacts and the avoidance ability of these species, such effects are not expected to be significant.

4. Actions to Minimize Impacts. Excavation and fill areas would be protected as soon as possible to prevent erosion. See Section 5.0 of the Environmental Impact Statement for a detailed discussion of the impacts and mitigative techniques.

K. Contaminant Determinations. See II.J.2.(c).

L. Aquatic Ecosystem and Organism Determinations.

1. Effects on Plankton. Turbidity levels will temporarily affect plankton populations through light transmission reduction.

2. Effects on Benthos. See II.A.4. and II.J.3.b.

3. Effects on Nekton. Temporary adverse effects on fisheries may result from turbidity and sedimentation during the construction period. See II.J.3.c.

4. Effects on Aquatic Food Web. Density of periphyton and benthic macroinvertebrates would decrease temporarily because of the loss of habitat. The Ohio River provides an abundance of habitat and with the implementation of proposed mitigation plans, long-term impacts are not expected.

5. Effects on Special Aquatic Sites.

a. Wetlands. No wetlands will be affected by the project.

b. Threatened and Endangered Species. According to the Federal List of Endangered Species and known occurrence of aquatic species within the basin, no threatened or endangered aquatic species occur at the site.

6. Other Wildlife. No effect.

7. Actions to Minimize Impacts. The proposed material placement activities would be accomplished under conditions that would minimize, to the extent practicable, adverse effects on the aquatic ecosystem.

M. Proposed Disposal Site Determinations.

1. Mixing Zone Determination. The discharge of liquid material from stormwater detention and dewatering facilities would not impact State use designations for the Ohio River.

2. Determination of Compliance with Applicable Water Quality Standards. Fill activities would be in conformance with the Commonwealth of Kentucky and State of Ohio standards. State 401 water quality certification would not be required as authorization is being pursued under Section 404(r) of the CWA.

3. Potential Effects on Human Use Characteristics.

a. Municipal and Private Water Supply. See II.I.

b. Recreational and Commercial Fisheries. See II.J.3.C. and II.L.3.

c. Water Related Recreation. The project in general, and the mitigation proposal contained in Section 5.0 of the Environmental Impact Statement would result in a positive net impact.

d. Aesthetics. See II.J.2.e.

e. Parks, National and Historical Monuments, National Seashores Wilderness Areas Research Sites, and Similar Preserves. Not applicable.

N. Determination of Cumulative Effects on the Aquatic Ecosystem. Development of the project would result in no permanent or significant negative impacts to aquatic life. It is likely that environmental enhancement would occur as a result of this project.

O. Determination of Secondary Effects on Aquatic Ecosystem. See II.N.

III. FINDINGS OF COMPLIANCE OR NONCOMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE.

A. No significant adaptations of the guidelines were made relative to this evaluation.

B. Alternatives.

1. Alternatives to this proposal are limited in number by the goals, location, and desire to maintain the safe operation of the existing facility during the construction

period. Any alternatives with less than full development would have impacts which are not significantly different from full development, as the site has long been radically altered from natural conditions. Correspondingly the reduced benefits of less than full development would make the project infeasible. Therefore reduced development alternatives and alternative sites were impractical and were not considered in this assessment.

C. Description of Proposed Work. See I.B, I.D.

D. The proposed placement of materials would not result in significant adverse effects on human health and welfare, including municipal and private water supplies, recreation and commercial fishing, plankton, fish, shellfish, wildlife, and special aquatic sites. Aquatic life and other wildlife would not be adversely affected. Significant adverse effects on aquatic ecosystem diversity, productivity and stability, and recreational, aesthetic and economic values would not occur.

E. Appropriate steps to minimize potential adverse impacts from any discharges on aquatic systems have been incorporated.

APPENDIX E

CLEAN WATER ACT: SECTION 404 (b)(1)

MYERS EVALUATION

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PRELIMINARY

Lock Improvements
SECTION 404 (b) (1) EVALUATION
John T. Myers Locks and Dam
Ohio River
Posey County, Indiana and Union County, Kentucky

This report concerning the proposed modification of John T. Myers Locks and Dam (Myers L&D) is submitted in accordance with Section 404 of the Clean Water Act of 1977 (Public Law 95-217).

1. PROJECT DESCRIPTION

A. Location. The project is located within the channel of the Ohio River, approximately 846 miles below Pittsburgh, Pennsylvania and 3.5 miles below Uniontown, Kentucky. The Locks are on the Indiana shoreline approximately 10 miles southwest of Mount Vernon, Indiana. The 400+ acre site, including staging areas, is presently developed for the existing project and conservation.

B. Description of Proposed Work. Myers L&D consists of one 1,200-foot long main lock chamber and one 600-foot auxiliary. The auxiliary chamber would be extended to an effective 1,200-foot length. In addition to the lock extension, a variety of lock wall extensions, supporting excavation, and bank shaping and armoring would be required. Additionally, several mitigation measures are proposed, in Myers and Smithland Pools. Measures would include notching weirs to promote backchannel flow and/or placement of rock structures in the river to provide substrate improvements.

Generally, fill material would include installation of prefabricated lock sections, cast in place concrete sections, bank armoring and backfill. Sand, clay and silt in excess of backfill needs would be disposed on-site above Ordinary High Water (OHW). Bank armoring materials may consist of one or more of the following: concrete salvaged from demolition of existing lock structures, excavated bedrock, and commercially acquired clean stone. Additionally, bioengineering techniques would be investigated for maximizing environmental quality of armored banks. Fill material would primarily consist of clean material excavated during construction and supplemented with commercially acquired clean fill, as needed. Material for rock mitigation structures would employ commercially acquired clean stone in addition to any reusable concrete and bedrock removed from the project.

Alternatives that would include placement of fill in Waters of the United States are all similar, varying only regarding when empty/fill system upgrades would be added. The two alternatives that were developed in detail are summarized as follows:

- 600-foot Extension with Additional Filling and Emptying Capacity (Plan 3 - With Culvert). The 600-foot auxiliary chamber would be extended an effective 1,200-foot length. Both the filling and emptying system would be enhanced to provide emptying and filling times comparable to the existing 1,200-foot main lock chamber. Additional actions would include extensions of the various landing and

guard walls that extend beyond the locks, both up and downstream as well as shaping and armoring of up to approximately 2,500 feet of river bank river bank.

- Auxiliary Extension Future/Phased (Plan 4). This alternative is substantively identical to Plan 3, above. The supplementary filling culvert and intake would simply be deferred for an estimated 20 years, or until strategically justified.

C. Authority and Purpose. The original project was authorized on September 17, 1958 by the Secretary of the Army under authority of Section 6 of the River and Harbor Act approved March 3, 1909, as amended. Investigation of the project pursued under the Ohio River Mainstem System Study is authorized by the resolution adopted by the Committee on Public Works of the U.S. Senate, dated May 16, 1955. Further authorization was given by a resolution adopted by the U.S. House of Representatives Committee on Public Works and Transportation dated March 11, 1982.

D. General Description of the Fill Material. On-site fill material would include the following: concrete and steel lock features; bank protection materials including reused concrete rubble and reused excavated shale and limestone; and backfill consisting of excavated silt, clay and sand. It is expected that no additional bank protection materials or backfill would be required. However, if additional material becomes necessary it would be acquired from clean uncontaminated sources. Material for mitigation sites may consist of reused concrete and stone and/or commercially acquired clean stone.

Approximate on-site quantities include: 125,100 CY of concrete, 8,300 tons of steel, 5,300 CY of stone, and 466,800 CY of fill. Actual quantities may vary, but not with significant consequences. Mitigation sites are expected to require approximately 67,000 CY of large stone. The point is that clean materials excavated on-site and, if necessary, clean materials from commercial sources would be employed.

E. Description of the Proposed Discharge Site. Up to about 4,000 feet of Ohio River bank above and below the locks may require some level of backfill and/or stone and concrete placement for bank protection. Concrete structures would also be placed in the river as up and downstream extensions of the landward lock and/or associated guide and guard walls. Water velocity in the area is relatively low because the majority of the river flow passes through the dam tainter gates, riverward of the locks. The area is also frequently disturbed by tow boat wheel wash and is relatively poor aquatic habitat. However, fish foraging (sauger, for example) does occur in the area. Mitigation areas include island backchannels, the head of islands, and below the gated section of Myers Dam.

F. Description of Disposal Method. Lock extension structural features would be either floated in and secured, or cast in place. Reused concrete, bedrock and backfill would be placed by clamshell dredge and by a variety of standard land-based construction equipment. Material would generally be placed off of barges. However, some near shore features may be placed with traditional land-based construction equipment.

2. FACTUAL DETERMINATIONS OF POTENTIAL SHORT-TERM OR LONG-TERM IMPACTS

A. Physical Substrate Determinations. On-site substrates primarily consist of sand, clay and silt. Siltation and disturbance from towboat wheel wash limits the area value as aquatic habitat. Mitigation site substrates are variable, typically consisting of extremes of either erosion or siltation. Follow-on planning would include avoidance of high quality substrates.

B. Water Circulation, Fluctuation and Salinity Determinations. On-site, placement of the fill would not affect water circulation, fluctuation or salinity. Some mitigation alternatives, though, are intended to improve local water circulation.

C. Suspended Particulate and Turbidity Determinations. Turbidity levels would be elevated locally during placement of fill. Following construction, turbidity levels would return to preconstruction levels. The project would not have a significant adverse effect on primary production or fisheries.

D. Contaminant Determination. The fill material would be obtained from concrete and bedrock removed from the site as well as soils excavated during construction. Supplementary material would be obtained from commercial pollution-free sources. On-site investigations revealed no reason to believe that the considered fill material is a carrier of contaminants.

E. Aquatic Ecosystem and Organism Determinations. The potentially affected on-site area is subject to significant siltation and highly disturbed by tow boat wheel wash. Placement of fill is not expected to affect significant habitats or organisms. Mitigation sites generally include areas of excessive erosion or sedimentation. Follow-on planning would include avoidance of high quality substrates.

F. Proposed Fill Site Determinations. The project would not impact state use designations for the Ohio River. Fill activities would be in conformance with the States of Kentucky and Indiana 401 Water Quality Certification standards. However, if the project is authorized under Section 404 (r), then state water quality certification is not required. The project would not significantly affect municipal water supply, recreational or commercial fisheries, recreation, aesthetics, or features of cultural or natural significance.

G. Determination of Cumulative Effects on the Aquatic Ecosystem. The project would not result in permanent or significant cumulative effects.

H. Determination of Secondary Effects on the Aquatic Ecosystem. Operation of the completed project would result in system effects in the Myers L&D pool and downstream in the Smithland L&D pool. Effects are associated with tow boat traffic impacts on fisheries. Secondary effects would be mitigated with a variety of ecosystem restoration actions as described in various sections, above.

3. FINDING OF COMPLIANCE OR NON-COMPLIANCE WITH THE RESTRICTIONS ON DISCHARGE.

A. Evaluation of Availability of Practicable Alternatives to Proposed Discharge Site Which Would Have Less Adverse Impact on the Aquatic Ecosystem. Alternatives to this

proposal are limited by the goals, location, and desire to maintain the safe operation of the existing facility during the construction period. Any alternatives with less than full development would have impacts that are not significantly different from full development, as the site has long been altered from natural conditions. Correspondingly, the reduced benefits of less than full development would make the project infeasible. Therefore, reduced development alternatives and alternative sites were impractical and eliminated in the initial screening process.

B. Compliance with Applicable State Water Quality Standards. While it is expected that the project would be in compliance with state water quality standards, this Section 404 (r) determination negates the requirement for state water quality certification.

C. Compliance with Applicable Toxic Effluent Standard or Prohibition under Section 307 of the Clean Water Act. Phase I testing suggests no presence of toxic substances. Planned follow-on tested would validate. Therefore, the project is not expected to violate Section 307.

D. Compliance with the Endangered Species Act of 1973, as Amended. A biological assessment concluded that endangered species would not be significantly impacted. Additional coordination with the US Fish and Wildlife Service would be performed at appropriate intervals during follow-on project development.

E. Evaluation of Extent of Degradation of the Waters of the United States. The placement of fill would not result in significant adverse impact on human health and welfare, including: municipal and private water supplies, recreational and commercial fishing, plankton, shellfish, wildlife and endangered species. With the proposed mitigation, would not result in significant adverse impact on aquatic ecosytstem diversity, productivity, or stability. As well, it would not significantly impact recreational, aesthetic, or economic values.

F. Appropriate and Practicable Steps Taken to Minimize Potential Adverse Impacts of the Discharge on the Aquatic Ecosystem. Potential adverse impacts would be minimized by employment of sound engineering design including erosion control methods and in-river silt curtains, as well as by avoidance of high quality habitats.

4. EVALUATION RESPONSIBILITY

On the basis of the guidelines, the considered disposal site for the fill material is specified as complying with the requirements of these guidelines.

Date: _____ _____

Robert E. Slockbower
Colonel, Corps of Engineers
Commander and District Engineer

APPENDIX F

GREENUP MITIGATION PLAN AND INCREMENTAL ANALYSIS

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Appendix F
Greenup Mitigation Plan

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Proposed improvements at Greenup Locks generally consist of (1) extending the existing 600-foot auxiliary lock chamber to 1,200 feet; and (2) adding lock chamber filling and emptying capacity. The goal of the proposed improvements is to upgrade the locks to a fully functional twin 1,200-foot system to better accomodate projected navigation traffic during future maintenance cycles.

1.0 PROPOSED PLAN

The most comprehensive extension approach would consist of constructing all proposed structural improvements in a single phase. Duration of the construction period would be three years. Auxiliary guide and guard wall extensions would be added to both lock chambers to make the project a fully functional twin 1,200-foot system. Additional filling and emptying capacity would also be added through the construction of a new filling culvert extending upstream to a newly constructed inlet, and addition of new laterals and an emptying culvert to be constructed downstream in a new land wall extension. Portions of the existing land wall would need to be demolished to accommodate these filling/emptying modifications. Other proposed modifications include relocation of the existing downstream miter gate and sill to a new location further downstream. Existing fisherman access would be lost completely during construction.

As currently proposed, the wall extensions would be constructed and assembled off-site and floated into place as fully assembled pontoons. Each pontoon would then be permanently attached to the fixed lock wall structure and an anchored nose pier to form a structurally integrated wall extension unit. Current plans call for the wall extensions to be constructed in a converted dry dock at the Robert C. Byrd Locks and Dam site at Gallipolis, Ohio.

New land wall monoliths for the land wall extension would be formed on site at a portable batch concrete plant and lifted into place. The new miter gate sill would consist of precast concrete structures to be lifted in place. Dredge spoil from excavation of unsuitable wet material for construction of the new land wall monoliths would be disposed on-site within the construction work limits. A sheet pile cutoff wall and dewatering would be necessary to construct the new fill culvert. Construction of the culvert and inlet would take place below the water table and the water level would have to be lowered to more than 30 feet. A two-stage well system is currently proposed to accomplish dewatering.

Under this alternative, all proposed improvements would be constructed in a single phase at an estimated total cost of approximately $165,000,000.

2.0 BASELINE CONDITIONS

Three terrestrial and three aquatic habitat types were identified at the Greenup project site during the May 1999 aquatic/terrestrial inventory (See Figure 1). Characteristics of each habitat type are summarized below.

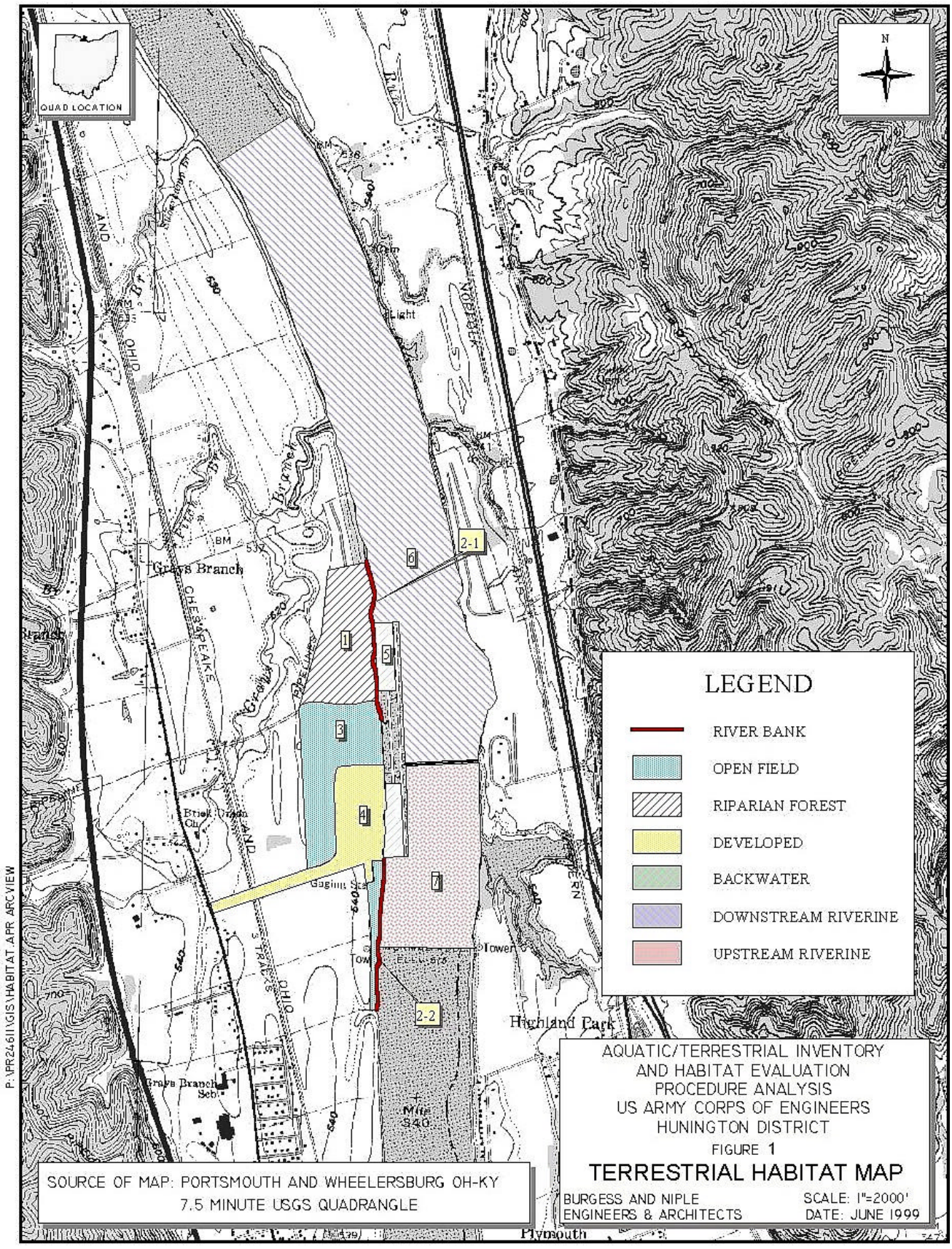
QUAD LOCATION
N
LEGEND
RIVER BANK
OPEN FIELD
RIPARIAN FOREST
DEVELOPED
BACKWATER
DOWNSTREAM RIVERINE
UPSTREAM RIVERINE
2-1
2-2
1
2
3
4
5
6
7
Graves Branch
Highland Park
Plymouth
SOURCE OF MAP: PORTSMOUTH AND WHEELERSBURG OH-KY
7.5 MINUTE USGS QUADRANGLE
AQUATIC/TERRESTRIAL INVENTORY
AND HABITAT EVALUATION
PROCEDURE ANALYSIS
US ARMY CORPS OF ENGINEERS
HUNINGTON DISTRICT
FIGURE 1
TERRESTRIAL HABITAT MAP
BURGESS AND NIPLE
ENGINEERS & ARCHITECTS
SCALE: 1"=2000'
DATE: JUNE 1999
P:\PR2461\GIS\HABITAT.APR ARCVIEW

FIGURE 1

Riparian Forest – This habitat type consists of approximately 47 acres located at the north end of COE property between the maintained areas around the locks and dam and the aerial gas transmission pipeline crossing further to the north. The tree canopy is open (40-percent canopy closure), and the area is dissected by several dirt roads and trails. Understory growth is dense throughout. Average canopy height was approximately 30 feet. Estimated age of canopy trees was 15 to 20 years.

Dominant canopy species include cottonwood (*Populus deltoides*), box elder (*Acer negundo*), silver maple (*Acer saccharinum*), and sycamore (*Platanus occidentalis*). Black locust, (*Robinia pseudoacacia*), black cherry (*Prunus serotina*), American elm (*Ulmus americana*), and box elder were dominant tree species in the understory.

Open Field – Frequently maintained open field areas occur in the vicinity of the locks and dam and gas transmission pipeline easement. These areas generally lack woody vegetation and were dominated by common pasture grasses and meadow forb species such as Italian ryegrass (*Lolium multiflorum*), orchard grass (*Dactylis glomerata*), timothy (*Phleum pratense),* brome grass (*Bromus tectorum),* black medic (*Medicago lupilina),* daisy fleabane (*Erigeron annuus*), burdock (*Arctium minus*), lambs lettuce (*Valerianella olitoria*), common chickweed (*Stellaria media*), goldenrod (*Solidago spp*), and red clover (*Trifolium pratense*).

River Bank – This habitat type occupies virtually the entire length of the river shoreline within the study area and was characterized by sparse vegetation and intermittently exposed sand beaches and mud flats. At the time of the inventory, the area was colonized primarily by willows (*Salix* spp.) and pioneer herbaceous species, including field horsetail (*Equisetum arvense*), lamb's quarters (*Chenopodium album*), beggar's tick (*Bidens frondosa*), swamp smartweed (*Polygonum coccineum*) and cottonwood seedlings. Mammal and bird tracks and other signs were prevalent in this area indicating its importance as a pivotal corridor used by many animal species. Portions of this habitat in active operations areas have been stabilized with riprap.

Upper Riverine – The upstream portion of the study area, starting at RM 340.5 and ending at the upstream limit of the lock structures, was approximately 400 meters in length. This area was characterized primarily by sand and silt substrate types with some debris. The shoreline within this zone consisted of a vegetated bank with a steep slope down to the edge of the river. The riparian zone along this stretch of the river was characterized by woody debris, undercut banks, root wads, root mats, and overhanging vegetation. Water depths within this area ranged from 2 to 5 feet along the shore to 10 to 20 feet approximately 6 meters from the bank. Total areal extent of the Upper Riverine habitat was estimated at 40 acres.

Backwater – The second habitat area observed during the aquatic inventory was a backwater (pool) area located around RM 341.0. This area was approximately 1,000 meters in length and was created by the lock structures. This habitat was characterized by sand and silt substrate types, with a predominance of silt in these areas. The shoreline consisted of a bank area with riprap and a vegetated shoreline around the lock facilities. Another area with similar habitat characteristics was located on the north side of the dam. Water depths within these areas were found to be 5 feet and less.

Lower Riverine – The last habitat area observed originates around RM 341.5 and extends to RM 343.0 downstream of the locks and dam. This zone was approximately 2,400 meters in length. Substrates within this zone consisted of various mixtures of clay, cobble, silt, sand, and gravel. Cobble substrates appeared to dominate in the vicinity of RM 342.0 to 343.0. The

shoreline within this zone was characterized by areas of cobble and sand, with evidence of past placement of dredge material along the shoreline. Water depths within this habitat area ranged from 5 to 8 feet along the shoreline dropping to around 11 feet approximately 6 meters from the shore.

3.0 POTENTIAL IMPACTS

Without Project Conditions

With the exception of the Riparian Forest habitat type, baseline terrestrial and aquatic habitat conditions at Greenup would not be expected to change significantly under a no-action scenario. Open Field areas would presumably continue to be mowed at current frequencies, thus maintaining approximately the same species composition and habitat structural values present at baseline. Portions of the river bank habitat are also periodically maintained for operational reasons, and this habitat type would not be expected to change significantly over the period of analysis. The relatively immature forested habitat would be expected to undergo natural succession, resulting in increased canopy height and closure, changes in species composition and dominance, and increased prevalence of mast trees, den and nesting trees, snags, downed logs and other habitat features associated with a more mature forest. Habitat values for river bank and open field habitats would be expected to remain constant over the period of analysis. Habitat values for riparian forest habitat would be expected to increase slightly over the same period, as the majority of selected forest evaluation species would be expected to benefit or remain indifferent to the changes brought about by natural succession.

With Project Conditions

Construction of the proposed improvements is anticipated to result in adverse impacts to aquatic and terrestrial resources in the project area and immediate vicinity. Anticipated impacts include direct habitat losses to construction activities, sedimentation impacts, fish losses, impacts to shoreline areas from increased queuing of navigation traffic, temporary loss of access to recreation facilities, and areawide impacts from projected navigation traffic increases.

The majority of anticipated impacts are attributable to construction of the landwall extension. Some additional impact to Backwater and Upper Riverine aquatic habitats would be experienced due to construction of the emptying and fill culverts.

Construction of the proposed lock improvements would result in unavoidable direct losses of both terrestrial and aquatic habitat. Direct habitat losses would result primarily from land clearing, dredging, blasting, and excavation activities related to construction. All terrestrial habitats delineated within the study area during the baseline assessment fall within the contractor work limits (CWL). All baseline terrestrial habitats within the CWL were assumed to be impacted for purposes of this evaluation. Approximately 17 acres of backwater aquatic habitat and approximately 1 acre of upper riverine aquatic habitat would be lost to dredging, rock excavation, and blasting activities. Table 1 offers a summary of anticipated impacts.

Table 1
Greenup Locks and Dam
June 1999

Habitat Type	Estimated Acreage Loss	Description of Impacts
Riparian Forest	47 acres	Land clearing for dredge spoil pile, batch concrete plant, construction laydown and access
Open Field	83 acres	Land clearing for construction laydown and access
River Bank	9 acres	Construction of landwall extension, filling culvert, construction access
Total Terrestrial	**139 acres**	
Backwater	17 acres	Dredging, rock excavation and blasting for landwall extension
Upper Riverine	1 acre	Dredging, rock excavation and blasting for fill culvert
Lower Riverine	0 acres	No direct habitat losses anticipated
Total Aquatic	**18 acres**	
Total	**157 acres**	

Dredging, excavation, and blasting activities related to the construction of the landwall extension, miter gate relocation, emptying culvert, and fill culvert inlet would result in turbidity and sedimentation impacts to local and downstream aquatic habitats, including potential impacts to identified mussel habitats. Modeling to quantify anticipated sedimentation impacts would be conducted by COE during a later phase in the design process.

Proposed instream construction activities including dredging, excavation, and blasting would result in some direct loss of fish individuals. Blasting produces shock waves, which may damage fish organs and tissues, resulting in critical injury or death to adult fish and juveniles. Blasting impacts may also damage or destroy fish eggs. Minimal fish losses are anticipated due to the use of controlled blasting techniques and the relatively confined nature of proposed instream activities; however, some loss of fish individuals is inevitable.

Adverse impacts to shoreline areas, including potential fish rearing areas and identified mussel habitat, may be anticipated from increased queuing of navigation craft during construction closure periods. Impacts would occur primarily due to “toeing in” (i.e., intentional beaching) by barges while waiting in queues during closures or other delay periods.

Construction of the proposed improvements would result in temporary loss of access to recreational areas and fishing sites during construction periods. Existing recreational facilities at the site would be off limits to the public but preserved during construction. Fishing access would also be restored following completion of the project.

Anticipated adverse impacts resulting from projected increases in navigation traffic consist primarily of increased velocity and substrate disturbances to fish from additional tow passages and increases in the number of juvenile fish entrained in propellers.

4.0 IMPACT ASSESSMENT

A Baseline HEP Assessment was conducted for the study area in June 1999. Twelve terrestrial species and eight aquatic species were selected for evaluation as shown in Table 2 below. Interagency coordination was conducted with FWS officials regarding the selection of evaluation species for the Baseline HEP Assessment in June 1999. The evaluation of habitats for these target species included the entire Corps lands in Kentucky, at the Greenup project. Aquatic habitats were inventoried for 0.5 mile upstream and 2 miles downstream for HEP analysis. A total of 519.258 baseline HUs were calculated for terrestrial habitats (for appropriate target species) in the study area and a total of 524.925 baseline HUs were calculated for aquatic habitats. Table 3 summarizes the results of the Baseline HEP Assessment by species.

Table 2-- Baseline HEP Evaluation Species
Greenup Locks and Dam
June 1999

TERRESTRIAL HABITATS		
RIPARIAN FOREST	**OPEN FIELD**	**RIVER BANK**
White-tailed deer	White-tailed deer	White-tailed deer
Northern raccoon	Northern raccoon	Northern raccoon
Red-tailed hawk	Red-tailed hawk	Beaver
Wood Thrush	Eastern meadowlark	Belted kingfisher
Red-eyed vireo	Meadow vole	Red-eyed vireo
Pileated woodpecker	Eastern cottontail	
Eastern box turtle		
AQUATIC HABITATS		
Backwater	Upper Riverine	Lower Riverine
Eastern gizzard shad	Eastern gizzard shad	Eastern gizzard shad
Northern largemouth bass	Flathead catfish	White bass
Northern bluegill sunfish		Northern bluegill sunfish
Smallmouth buffalofish		

Impacts were assumed for 139 acres of upland properties at the Greenup Lock & Dam facility. This assumes impacts to 100% of terrestrial habitats within the construction work limits and provides a conservative estimate of the impact and the cost of mitigation. This includes 9 acres of river bank riparian habitats that would be impacted by the proposed action. Table 1 above summarizes the habitat losses assumed as the "worst case" described here. Aquatic habitat losses were also assumed to be complete within the construction work limits where dredging and excavation would remove existing habitat.

Table 3-- Baseline Habitat Conditions
Greenup Locks and Dam

Evaluation Species	Habitat Type	HSI Value	Acreage	Habitat Units
White-tailed Deer	Riparian Forest	0.166	47.0	7.802
	River Bank	0.166	9.0	1.494
	Open Field	0.750	83.0	62.250
	Species Total			71.546
Northern Raccoon	Riparian Forest	0.250	47.0	11.750
	River Bank	0.250	9.0	2.250
	Open Field	0.400	83.0	32.200
	Species Total			47.200
Beaver	River Bank	0.500	9.0	4.500
	Species Total			4.500
Meadow Vole	Open Field	0.775	83.0	64.325
	Species Total			64.325
Eastern Cottontail	Open Field	0.40	83.0	33.200
	Species Total			33.200
Red-tailed Hawk	Riparian Forest	0.950	47.0	44.650
	Open Field	0.833	83.0	69.139
	Species Total			113.789
Wood Thrush	Riparian Forest	0.400	47.0	18.800
	Species Total			18.800
Red-eyed Vireo	Riparian Forest	0.707	47.0	32.229
	River Bank	0.000	9.0	0.000
	Species Total			32.229
Pileated Woodpecker	Riparian Forest	0.132	47.0	6.204
	Species Total			6.204
Belted Kingfisher	River Bank	0.825	9.0	7.425
	Species Total			7.425
Eastern Meadowlark	Open Field	0.880	83.0	73.040
	Species Total			73.040
Eastern Box Turtle	Riparian Forest	1.000	47.0	47.000
	Species Total			47.000
All Terrestrial Species	**Project Area Total**		**434.0**	**519.258**

Table 3 continued

Evaluation Species	Habitat Type	HIS Value	Acreage	Habitat Units
Eastern Gizzard Shad	Backwater	0.800	23.0	18.400
	Lower Riverine	0.466	210.0	97.860
	Upper Riverine	0.466	40.0	18.640
	Species Total		273.0	134.900
White Bass	Lower Riverine	0.599	210.0	125.790
	Species Total			125.790
Northern Blackbass	Backwater	0.792	23.0	18.216
	Species Total			18.216
Northern Bluegill Sunfish	Backwater	0.878	23.0	20.194
	Lower Riverine	0.883	210.0	185.430
	Species Total			205.624
Smallmouth Buffalo	Backwater	0.765	23.0	17.595
	Species Total			17.595
Flathead Catfish	Upper Riverine	0.570	40.0	22.800
	Species Total			22.800
All Aquatic Species	**Project Area Total**		**273.0**	**524.925**

Mussel surveys conducted in the project area and vicinity during May and August 1999 identified two principal areas of confirmed mussel habitat downstream of the Greenup Dam. The most productive area began approximately 1 mile downstream of the dam (RM 342.0) along the Kentucky shore and extends downstream for approximately another mile to the limits of the study area (RM 343.0). The mussel community in this area was characterized as a low density, newly colonizing bed, approximately 20 years maximum age. Substrates in this area consisted of relatively stable deposits of sand, gravel and cobble conducive to formation of mussel colonies. The other area identified occurred between approximately 1,300 and 3,200 feet downstream of the dam along the Ohio shore. Substrate in this area was primarily bedrock with strips of cobble, gravel, and sand. Mussels were found on these strips in this area.

Impacts to widely distributed aquatic habitats may be anticipated for the proposed lock improvements at Greenup from increased navigation traffic impacts in Greenup and Meldahl dam pools due to the accomodated traffic during future maintenance periods. Anticipated impacts to fish consist primarily of velocity disturbance, sediment resuspension, and propeller entrainment of juvenile fish associated with larger and more frequent tow passages. Anticipated traffic impacts in Greenup and Meldahl pools were assessed by COE Louisville District using NAVPAT modeling, a modified HEP evaluation procedure specifically tailored to assessment of navigation impacts on aquatic habitats. Best - and worse-case traffic increase scenarios were modeled under NAVPAT for target years 2050, 2056, and 2058 in both dam pools to obtain net projected impacts in NAVPAT HUs. Mitigation of entrainment impacts was determined to be infeasible, resulting in a total of 2,635 HUs of mitigatable impacts for both pools.

5.0 ENGINEERING DESIGN & CONSTRUCTION SPECIFICATIONS WHICH AVOID OR MINIMIZE EFFECTS

Anticipated sedimentation impacts to aquatic habi tats resulting from dredging, excavation, and blasting activities cannot be avoided entirely, but can be effectively minimized. Sedimentation impacts are expected to be temporary; therefore, long -term reduction, rectification, or compensation strategies a re not considered appropriate. Several minimization strategies are described below and would be explored during the detailed design and construction specification phases.

Sediment retention structures such as turbidity curtains are designed to intercept a nd contain suspended sediments generated by construction activities within a water body or on adjacent banks or shorelines. Turbidity curtains are constructed of weighted geotextile material attached to anchor points in the water and held afloat by a flot ation collar, buoys, or other flotation device. Turbidity curtains are placed around the work area, generally parallel to the direction of flow, and act to intercept suspended sediments within a limited area and contain them for a sufficient period of tim e to allow them to settle out. These structures are suitable for environments with moderate wave action given that they are anchored, permeable and designed with appropriate slack to absorb wave energy.

Although turbidity curtains can be engineered for mo re extreme settings, they generally work best in minimal to moderate flow conditions (i.e., velocities up to 5 feet per second or less and currents of 3 knots or less). Sediments intercepted and settled by the curtain may cause localized sedimentation imp acts. These sediments are generally left in place. Removal would inevitably resuspend sediments and pose potential risks to construction activities and distant habitats.

Where work areas cannot be isolated from the water column, turbidity curtains are the only widely available, practicable technology for minimizing sedimentation impacts resulting from work in the water column itself. Use of turbidity curtains is standard practice for COE projects involving these conditions, and when used within the above -described limitations, they represent a feasible minimization strategy for anticipated sedimentation impacts.

Numerous effective measures exist for minimizing sedimentation impacts to aquatic environments resulting from land disturbances during constructio n. Sensitive construction timing can be used to avoid or minimize activity during spawning or migration periods and take advantage of low-flow periods. Preservation of vegetated buffer strips along stream banks and slope breaks is an effective strategy which should be employed wherever feasible. Land disturbing activities and equipment movement would be limited as an obvious minimization strategy. When these fail, structural sediment and erosion control measures must be employed to minimize impacts to r eceiving waters.

Examples of structural erosion/sediment control practices commonly used at construction sites include silt fence, straw bale barriers, sediment traps and basins, storm drain and culvert inlet protectors, diversion ditches, level spreaders, water bars and check dams, erosion -control matting or fabric, mulching, temporary seeding, and dust control. Erosion sediment control practices are most effective when considered and implemented within the context of a Comprehensive Stormwater Pollution Prevention Plan (SWPPP) or similar plan, for the entire construction site. Standard erosion/sediment control practices are a feasible and effective strategy for minimizing sedimentation impacts at the Greenup site. An SWPPP would be

required for construction of the proposed action as land-disturbing activities would exceed 5 acres. Typical erosion/sediment control measures used are further described in the COE document *Engineering and Design – Handbook for the Preparation of Storm Water Pollution Prevention Plans for Construction Activities, EP 1110-1-16* and numerous other documents.

Compensation is the stated mitigation objective for unavoidable fish losses due to blasting, dredging, and excavation activities. Two potential compensation strategies have been identified: (1) stocking of fish and (2) monetary compensation.

Fish stocking has been proposed as a compensatory measure for unavoidable fish losses resulting from in-stream construction activities. Fish losses are expected to be minimal; therefore, only nominal stocking of fish is proposed. According to state resource agency contacts, nominal fish stocking would be both inappropriate and ineffective as a compensatory strategy. Justifiable numbers of fish for restocking would be too low to be effective and available species would not be representative of the diversity of anticipated losses. The primary ecological value of fish stocking is to maintain populations of native fish species which no longer reliably reproduce naturally due to human alterations such as sedimentation of tributary streams. Such fish species are not expected to be impacted by blasting activities at Greenup. Instead, fish populations can be expected to recover naturally. Natural recovery is the preferred option as fish stocking also poses the potential for introduction of inappropriate species or inferior genetic stock.

Monetary compensation is a standard means of compensating for fish losses and is required by law. Monetary amounts would be determined by state resource agency enforcement officials based on actual impacts. Provisions for this compensation would be part of the specification for the construction action.

Impacts to mussel species from "toe-in" impacts are to be avoided as a matter of policy. Increased traffic queues during unavoidable closures and delays associated with construction of the proposed improvements may result in such effects to near-by mussel communities. Avoidance is considered an achievable objective in the case of these impacts and, therefore, must be given precedence in accordance with the mitigation sequence established by the CEQ and adopted by COE. Mooring facilities would allow queuing tows to wait transit at the lock within the navigation channel and off sensitive near-shore mussel communities. Mooring structures provide vessels a place to tie off while queuing and are a potentially effective strategy for avoiding adverse impacts to shoreline aquatic habitats, including identified mussel habitats downstream of the Greenup Locks. Two types of mooring facilities are currently considered for use on the Ohio River: mooring buoys and mooring cells.

Mooring buoys are a potentially effective strategy for regulating queue traffic and thereby avoiding toe-in impacts to shoreline habitats and mussel beds. Various designs for mooring buoys exist, including cylindrical and spherical shapes and floating or anchored designs. However, preliminary COE engineering studies indicate that a spherical, floating bobber type buoy is favored by the navigation industry. Floating mooring buoys fluctuate with changing water levels, and with impacts from vessels or debris. Various anchoring configurations are available to meet varying geotechnical and water elevation conditions. Use of mooring buoys is the preferred alternative from an environmental perspective because installation and use of mooring buoys would result in fewer adverse impacts than construction and operation of mooring cells.

Mooring cells are fixed, circular sheet pile structures constructed in the water and filled with either sand or gravel and capped with concrete or filled almost entirely with concrete. Fixed mooring rings are attached to the riverside of the cell at various heights to accommodate fluctuating water levels. Mooring cells provide a massive, fixed mooring structure greatly preferred to floating buoys by navigation industry. Tie-off at mooring cells is considered more

secure and safer for vessel personnel, and the fixed structure provides leverage for vessels casting off and orienting when preparing to lock through.

Recreational access losses during construction at the Greenup site cannot be avoided, further minimized, or reduced while still achieving project objectives. Therefore, rectification and compensation objectives have been established for mitigation of this category of impacts. Existing recreational facilities on-site consist of parking, picnicking, rest rooms, and fishing access areas. Forested areas on-site are also used informally for walking and by off-road vehicles. Current project plans call for reconstruction of lost facilities to current design standards. This would entail significant improvement in fisherman access to the tailwaters along the Kentucky shoreline. Construction of one or more fishing access points, including facilities for handicapped access, has been proposed in preliminary consultations with state resource agencies. The ultimate disposition of recreational facilities would be arranged in consultation with State resource agencies during detailed design.

6.0 PRELIMINARY SCREENING OF MITIGATION CONCEPTS

Officials from FWS, ODNR, and the Kentucky Department of Natural Resources (KDNR) were consulted during the development of preliminary mitigation alternatives for project and areawide impacts to fish and wildlife resources. Preliminary mitigation alternatives discussed included:

- Construction of two or three 1,000-foot submerged dikes in the tailwaters of Greenup Dam to provide boulder/cobble habitat for fish and mussels.
- Development of vegetated shallows in the Little Sandy River embayment or other suitable tributary embayment to compensate for upper riverine habitat losses.
- Floating mooring buoys to protect shoreline areas from anticipated queuing impacts.
- Monetary compensation and "goodwill" stocking for direct fish losses resulting from blasting, dredging, and excavation impacts.
- Sediment and erosion controls during construction to minimize sedimentation impacts to downstream mussel beds.
- In-kind replacement of impacted terrestrial habitats on site.
- Development of handicap-accessible fishing access facilities on site.

Potential mitigation strategies were identified and evaluated based on their (1) relevancy to mitigation objectives for each category of impact; (2) appropriateness to the environmental conditions and habitats at the site and vicinity; (3) record and probability of success; and (4) practicability, including factors such as availability of sites and materials, ease of implementation, compatibility with navigation operations, and costs.

Mitigation objectives for direct habitat losses consist of rectification or compensation through creation of replacement or substitute habitats of at least equivalent HU value to that of lost habitats. Potential compensation strategies are described and evaluated below.

Aquatic Habitats

Instream Habitat Improvement Structures - When applied within the context of a stable, well-vegetated, sustainable stream or river corridor, artificially constructed instream habitat structures are an effective strategy for enhancing the quality and value of aquatic habitats. Much of the existing literature and experience to date concerning instream habitat structures has focused on coldwater habitats and smaller tributary streams, but many instream structures are adaptable to riverine or lacustrine environments. Instream habitat structures considered fall into seven general categories: (1) sills and dams; (2) deflectors; (3) substrate placement; (4) random rock structures; (5) cover structures; (6) submerged dikes; (7) off-channel ponds, coves, and shallows. Available alternatives in each of these categories are discussed in further detail below.

Sills and Dams- Sills and dams are low stage instream habitat structures that extend across the full width of the affected channel and are intended primarily to encourage formation of pool habitats upstream or downstream of the structure, or both. Other benefits of sills and dams include collection and retention of gravel substrates, facilitating fish passage, trapping fine sediments, and improving stream flow patterns. Structures in this category include weirs, check dams, boulder and log dams, plunges, and overpours. They are typically set at a level below bankful stage and are not intended to retain or impede channel forming or high flows, or to impede fish passage. They may be oriented perpendicular to flow to maximize backwater effects or diagonally to achieve redistribution of scour and deposition patterns downstream. "V-," "U-," and "K"-shaped configurations can also be used to promote specific desired effects. Notched structures allow for maintenance of a concentrated low flow channel where this effect is desirable. Sealing difficulties and undermining are the chief problems encountered with these types of structures.

Sills and dams are most successful on smaller (less than 30 feet wide), high gradient (0.5 to 20 percent slope) tributary streams with stable, well-defined banks, stable substrate, and not subject to excessive flood flows. They are generally not appropriate to larger riverine channels or lacustrine systems. Because they are designed to extend across the full width of the channel, they obviously pose a potential obstacle to watercraft in navigable or recreational waterways. Therefore, structures in this category are not considered a feasible mitigation strategy for the proposed action.

Deflectors- Deflectors are instream structures, which extend out from the bank, usually in a linear, peninsular, or triangular shape, but not across the full width of the channel. They are used primarily to direct flow in more desirable patterns, such as away from banks or in a meandering pattern, and to form scour pools. However, they can be used to achieve a wide variety of other effects and benefits, including bank protection, protecting desirable substrates from sedimentation, encouraging establishment of riparian vegetation through silt bar formation, creating shelter pools, increasing water velocity, and maintaining cooler temperatures. Examples of structures in this category include jetties, barbs, wing deflectors, and spur dikes. Rock and rock-filled construction is most common, but deflectors can be constructed of logs or timbers, or a combination of materials.

Deflectors can be used successfully on streams of various sizes and are not necessarily limited to smaller tributary streams. Deflectors are typically applied to wider, shallower, low-gradient stream reaches lacking pools and cover, to straight reaches in order to encourage

sinuosity, or to outside bends for bank erosion protection. Deflectors are generally not recommended for steep gradients, constricted channels with high transport capacities, sandy substrates, debris prone reaches, and reaches with extreme flow fluctuations.

Deflectors are typically angled downstream at approximately 45 degrees from the prevailing current. In triangular configurations, a back-bracing element is positioned downstream at approximately 90 degrees to the deflecting face of the structure. Double-wing deflectors consist of a pair of deflectors located on opposite banks, creating a local constricted zone with increased velocity and resulting scour pool. Typical deflector angles and configurations can be varied to suit site conditions and achieve specific effects. Temporary deflector structures can be used to study and refine desired effects in more complex situations. Deflector height is keyed to low flows and ideally should fall within the range of 0.5 to 1 foot above the low-flow elevation. Deflector length varies according to stream size, flow characteristics, and the specific effects desired; however, experience suggests that deflector lengths in the range of 50 to 80 percent of channel width are required to achieve measurable results.

Although deflectors are adaptable to a variety of conditions, including larger riverine channels, they are not considered a feasible mitigation alternative for the Greenup site. As discussed above, experience suggests that deflectors are most beneficially applied in shallower, low-gradient riffle areas where pools and cover are limiting factors, and that lengths of 50 to 80 percent of channel width are required to achieve measurable benefits. Pool habitat and cover are not limiting factors at Greenup, and deflectors in the effective length range would pose an unacceptable hazard to navigation. Use of deflectors on a smaller scale to influence benefits in shoreline areas only was also considered; however, these would also pose a navigation hazard to vessels intentionally beaching or unintentionally straying out of the main navigation channel as they would not be submerged safely below vessel draft depths, but may be invisible during high water periods.

Substrate Placement- Direct placement of desirable substrates at appropriate locations in the stream channel can be an effective strategy for enhancing fish-spawning activity and creating macroinvertebrate habitat. Substrate placement can be used to address flood scouring, dredging, and channelization impacts, or to supplement natural deficiencies. Several factors are important to consider in determining whether substrate placement is an effective strategy. Site selection is a key factor. Pool/riffle interchanges are ideal locations. Where substrate placement is being considered to supplement a natural deficiency, it is important to consider why natural substrate deposits are not present. Where high flows and/or gradients are resulting in scouring of natural deposits, velocity-reducing structures such as deflectors should be used in conjunction with substrate placement. If substrates are naturally fine, or if sedimentation is a problem in the stream reach or watershed as a whole, isolated substrate placement projects may be ineffective. Other considerations include the availability of local gravel sources and site accessibility.

Substrate placement is not a feasible mitigation alternative for the Greenup site. Isolated substrate placement would have negligible benefits in a channel the size of and under the controlled pool conditions present at Greenup. Substrates are naturally fine in the backwater and upper riverine habitats present in the project area and artificially placed cobble or gravel substrate beds would be subject to rapid sedimentation, eliminating any potential benefits within a short period of time.

Random Rock Structures- This category of instream habitat structures consists of individual rocks, boulders or artificial boulders placed in the stream channel itself, away from banks. They may be placed singly or in clusters, depending on the size of stream, flow characteristics, stream morphology, and the desired effects. Their primary benefit is the formation of localized scour pools for fish cover and rearing. Random rock structures are most

effective when placed in wide, shallow riffle/glide areas where pool habitat is lacking and water velocities are great enough to scour pools. Sandy and other fine, unstable substrates should be avoided as random rock structures would tend to become buried under these conditions.

Instream random rock structures are not a feasible mitigation strategy for the Greenup site due primarily to the size and depth of the river channel and potential hazards to navigation. However, use of submerged boulders in protected shoreline pool areas to enhance available cover is a potentially applicable variation of this treatment discussed further in the following section.

Cover Structures-Cover structures are structures built into or anchored to stream banks to provide cover and rearing habitat for fish. They are intended to imitate and provide benefits similar to those of natural undercut banks. Cover structures are especially effective when used in combination with bioengineering techniques on adjacent banks to form an integrated bank stabilization system. Cover structures have successfully been constructed of a variety of materials, including logs, timbers, planks, rocks and boulders, submerged trees and brush, metal, and fiberglass. Examples of cover structures include overhangs and ledges, lunkers, submerged tree/brush shelters, and boulder clusters. Cover structures are most effectively used in pool areas or deep glides where water depths are sufficient to keep cover structures submerged.

Cover structures are a potentially feasible mitigation strategy for the Greenup site. Ideally, cover structures would be integrated into a comprehensive strategy for stabilizing and rectifying adjacent river banks and riparian habitats.

Submerged Dikes- Construction of submerged dike structures in the restricted tailwater zone immediately downstream of Greenup Dam is a potential mitigation strategy proposed during preliminary consultations with state resource agencies. As proposed, two or three parallel rock dikes each approximately 1,000 feet in length and spaced 300 to 400 feet apart would be sited in this restricted zone. Orientation would be with the current (parallel to river banks and lock walls). The dikes would just break the surface at normal pool levels and be 10 to 20 feet wide across at the top surface. Periodic breaks in the length of each dike would provide velocity shelters for fish. Proposed location of the dikes would be approximately 100 feet downstream of dam gates 3 and 4.

Literature and experience regarding the ecological benefits of parallel submerged dike structures of this type is limited; however, their benefits may be inferred to be similar to those documented for riprap revetment or sedimentation control structures such as wing and spur dikes. Fish are known to congregate in dam tailwater areas, particularly during spawning migrations, and certain fish species would benefit from improved substrate conditions and velocity shelter offered by rock dike structures such as those proposed. Mussels and other macroinvertebrates have been documented to colonize riprap revetment and rock dike structures placed in large channels. Assuming access could be provided with safety, construction of tailwater dikes could also offer potential recreational benefits to anglers.

Construction of parallel rock dikes in the tailwaters of Greenup dam is a technically feasible mitigation strategy for aquatic impacts at Greenup. The tailwater area is restricted to navigation traffic and is accessed only periodically by maintenance vessels. Constructing the dikes to the surface at normal pool levels may pose an unacceptable operational hazard to these maintenance vessels; however, submerged dikes constructed below the draft of these vessels would still offer potential benefits to the aquatic community. As proposed, angler access could only be by boat, and poses safety hazards from lock emptying flows and dam return flows. An alternate location along the Ohio shore would appear to provide greater opportunity for angler access from either the shore or from the hydroelectric plant, possibly through the construction of pier or bridge structures originating at publicly accessible areas of the plant. The alternate

location would also appear to interfere less with maintenance craft operations. Figure 4 shows the approximate alternate location for the tailwater dikes.

Off-Channel Ponds, Coves, and Shallows- Construction of off-channel ponds, coves, and shallow areas can be used effectively in enhancing fish rearing potential, as well as providing other benefits. Off-channel shallow areas provide sheltered nursery areas for juvenile fish as well as habitat for aquatic plants, macroinvertebrates, and amphibians. Off-channel areas can be created or incorporated into habitat improvement projects using a variety of techniques, including preservation of cutoff meanders or oxbows in channelization projects, construction of berms or dikes immediately offshore of stream banks or shorelines to encourage development of protected shallow areas, and construction of adjacent wetland areas. Berms or dikes may be constructed of a variety of materials, including rock, timber bundles, coconut, or other natural fiber rolls. Berms or dikes may be submerged or set at desired above-water elevations. Construction of protected shallow areas in this manner can be used in combination with bioengineering measures for upslope bank protection for an especially effective combination. Shallows may be planted to accelerate development of aquatic or emergent vegetation, or allowed to colonize naturally if native seedbank sources are available. Ideally, creation of adjacent wetland areas would capitalize on the existence of natural features such as old oxbows or ponds, but may require extensive earthwork and import of suitable substrates as well as seeding or planting.

Construction of off-channel vegetated shallows in the Little Sandy River embayment or other nearby tributary embayment was proposed as a potential mitigation strategy during preliminary consultations with state resource agencies. However, project mitigation objectives state a decided preference for construction of mitigation features on COE-controlled lands, preferably at the site of impact, in order to maximize mitigation benefits to local ecological populations, ensure long-term viability, avoid land acquisition costs, and avoid potential liabilities associated with construction and long-term maintenance on properties owned or controlled by others. Construction of vegetated shallows off-site is not responsive to these objectives. Potential sites for construction of similar protected shallow areas are available in the project area; therefore, construction of protected shallows on COE property at the project site represents a feasible mitigation alternative.

Terrestrial Habitats

Rectification of Riparian Forest Habitat - An estimated 47 acres of riparian forest habitat would be impacted through landclearing for construction laydown and access, disposal of approximately 20,000 cubic yard (cy) of dredged material, and construction of a dedicated precast concrete plant on site. The following describes a general plan for rectification (restoration) of forested habitat on site.

The existing immature wooded habitat dominated by black locust, cottonwood, box elder, and American elm would be replaced by a floodplain forest ultimately dominated by silver maple and sycamore in the canopy. Similar forested habitat exists to the north of COE property boundaries at the Greenup site and could serve as a model for final design and a potential seed source. In a natural succession sequence, a forest of this type would likely regenerate initially with pioneer species such as cottonwood, willow, and black locust. Relatively short-lived pioneer species would give way in the next successional stage to silver and red maples (*Acer rubrum*), sycamore, box elder, American elm, green ash (*Fraxinus pennsylvanica*), black cherry, shagbark hickory (*Carya ovata*), and other secondary invader species. Ultimately, silver maple and sycamore would be expected to dominate the canopy along with mature individuals of second stage species. Box elder, American elm, black cherry, and green ash could be expected

to persist in the understory along with other understory tree and shrub species characteristic of moist woods such as hackberry (*Celtis accidentalis*), ironwood (*Carpinus caroliniana*), and arrowood viburnum (*Viburnum recognitum*). Characteristic herbaceous species would include jewelweed (*Impatiens* spp.), common elderberry (*Sambucus canadensis*), wood nettle (*Laportea canadensis*), wingstem (*Actinomerus alternifolia*), poison ivy (*Rhus radicans*), cleavers (*Galium aparine*), and other moist woods species.

Depending upon availability, appropriate species for planting would include those listed below. Pioneer species (e.g. black locust, cottonwood) generally colonize from existing seed banks or nearby seed sources and would not need to be planted.

silver maple (*Acer saccharinum*)	black walnut (*Juglans nigra*)
sycamore (*Platanus occidentalis*)	American elm (*Ulmus americana*)
red maple (*Acer rubrum*)	pin oak (*Quercus palustris*)
green ash (*Fraxinus pennsylvanica*)	box elder (*Acer negundo*)
shellbark hickory (*Carya lacinosa*)	shagbark hickory (*Carya ovata*)
buckeye (*Aesculus glabra)*	butternut (*Juglans cinera*)
sweet gum (*Liquidambar styraciflua*)	black cherry (*Prunus serotina*)

Site preparation would consist of grading and plowing to the subsoil to counteract compaction impacts, and clearing of slash and debris. A significant site preparation task would be distribution and inc orporation of the dredge spoil pile into existing soils. Incorporation of dredge spoil over the entire acreage to be reforested would alleviate the need to amend potentially infertile sediments and modify potentially adverse spoil pile topography. Contro lled burning could be used to dispose of woody debris. Debris too large to be incorporated (e.g., concrete demolition debris) or removed from the site could be buried. A prior application of herbicide may be necessary to control initial weeds.

It is assumed that seedlings would be bare root and planted at a density of approximately 600 per acre to ensure adequate survival. Hand planting is assumed, although mechanical planting could be used. Planting would be in groups of three to four seedlings spaced approximately 10 feet apart. Natural topography and soil characteristics may favor plantings of certain species over others at particular locations across the site, but plantings would generally be random by species. Plantings could be phased in over a period of several years, if desired. Watering during dry periods could be accomplished by truck on an as-needed basis. Monitoring is critical to assess and ensure seedling vigor and survival, especially in the first 2 years after planting. Long-term monitoring at annual, and later, 5-year intervals is recommended to document success and identify and remedy potentially harmful conditions.

A number of active management and maintenance measures are proposed over the long term to optimize habitat values in a reas proposed to be reforested. Proposed management and maintenance measures would focus on adding, accelerating, or maintaining habitat features and values which would not be expected to develop during the course of natural succession or which would develop more slowly in the absence of intervention. Key proposed management and maintenance actions are summarized below.

- Plant fast-growing canopy species (e.g. sycamore, silver maple) to maximize forest growth rates and thereby accelerate attainment of optimum tree height, diameter, and canopy closure values.
- Plant and manage for at least four large mast (acorns, hickory nuts) trees per acre.
- Install or preserve snags, stumps, and downed logs at establishment to accelerate availability of nest sites and food sources to species such as pileated woodpecker and raccoon.

- Monitor the need for and girdle or cut additional trees at approximately 5 -year intervals to replace and establish additional snags, logs, and stumps.
- Manage for approximately 30 percent shrub c rown cover and 75 percent canopy closure. The preferred shrub distribution pattern is scattered, dense clumps.
- Maintain a woodland size of greater than or equal to 50 acres to favor interior forest -dwelling species such as wood thrush, pileated woodpecker, and warblers.

Revegetation of Open Field Habitat- Approximately 83 acres of frequently maintained open field habitat on -site would also be impacted during construction of the proposed improvements. Open Field habitat areas are currently dominated by co mmon introduced pasture grass species such as Italian ryegrass, orchard grass, and timothy. Introduction of shrub cover and native grass species, in particular warm season grasses such as big bluestem (*Andropogon gerardi*), little bluestem (*Andropogon scoparius*), indiangrass (*Sorghastrum nutans*), and switchgrass (*Panicum virgatum*) would enhance species diversity and habitat structure in this habitat type. Site preparation would consist of plowing and disking to create a good seedbed, and prior application of herbicide to control initial weed growth. Seeding could be broadcast or accomplished with a seed drill. Maintenance would consist primarily of controlled mowings and possibly controlled burning to encourage and maintain desired species.

Active manage ment strategies proposed to optimize habitat values in Open Field habitat include:

- Plant and manage for approximately 20 percent shrub cover in dense, well -distributed clumps throughout the Open Field habitat.
- Seed and manage for approximately 80 percent herbaceous cover, with at least 80 percent in grasses.
- Maintain an optimal average annual height of 12 inches for herbaceous vegetation.
- Mow selected areas, for example, at habitat edges and along roads, to provide short grass (4 inches or less) in spring months for cottontail breeding.
- Preserve or install perch sites for meadowlark (e.g., fence posts, earthen mounds, utility line or poles) at an optimum spacing of 100 feet or less.

River Bank Bioengineering Treatments - Approximately 4,000 linear feet (lf) of River Bank habitat totaling an estimated 9 acres would be impacted as a result of construction of the landwall extension and culvert features. Mitigation options for this habitat type are limited by the need for reliable bank stabilization measures an d current operations and maintenance (O&M) practices that preclude the establishment of mature trees on banks in operation areas. Use of soil bioengineering techniques in combination with standard structural bank stabilization measures offers the potential to restore River Bank habitat values while still meeting O&M requirements. Soil bioengineering techniques typically employ easily rooted shrub species such as willows (*Salix* spp.) rather than trees, and are amenable to periodic maintenance to preserve a shrubby condition.

The plan would use a combination of riprap stabilization at the toe of slope and joint plantings, live fascines, and brushmattressing to stabilize upper slopes (See Figure 2). Individual live stakes planted in riprap joints and backfill ed contribute to stabilization by preventing washout of fines, dissipating wave energy, and removing excess soil moisture. Live fascines consist of a series of contour trenches filled with bundles of live branch cuttings from easily rooting shrub species. A row of vertically oriented live stakes is generally also placed along the

downslope edge of each trench. Brushmattressing also uses bundles of live branch cuttings but these are placed and anchored over the stream bank in a continuous matress -like layer rather than in trenches. One or more live fascine trenches are typically installed at the downslope edge of the brushmatress to ensure stability. Brushmatressing provides immediate protective cover and promotes rapid establishment of vegetation.

Shrub species appropriate for use in the proposed bioengineering measures include the following:

Eastern baccharis	*(Baccharis halimifolia)*	Coyote willow	*(Salix exigua)*
red-osier dogwood	*(Cornus sericea ssp sericea)*	Prairie willow	*(Salix humilis)*
Balsam popular	*(Populus balsamifera)*	Sandbar willow	*(Salix interior)*
Eastern cottonwood	*(Populus deltoides)*	Shining willow	*(Salix lucida)*
Swamp rose	*(Rosa palustris)*	Yellow willow	*(Salix lutea)*
Virginia rose	*(Rosa virginiana)*	Black willow	*(Salix nigra)*
Allegheny rose	*(Rosa allegheniensis)*	Pupleosier willow	*(Salix purpurea)*
red raspberry	*(Rubus idaeus ssp. stirgosus)*	American elder	*(Sambucus canadensis)*
Peachleaf willow	*(Salix amygdaloides)*	red elderberry	*(Sambucus racemosa)*
Bebb's willow	*(Salix bebbiana)*	Snowberry	*(Symphoricarpos albus)*
Pussy willow	*(Salix discolor)*	Arrowwood	*(Viburnum dentatum)*
Hubblebush viburnam	*(Viburnum lantanoides)*		

Off-Site Creation/Restoration- Creation or restoration of compensating habitat at a location other than the project site is a potential mitigation strategy for terrestrial habitats at Greenup. However, mitigation objectives call for rectification of habitats on or as close as possible to the site of impact and on COE-controlled lands to the extent possible and justifiable. On site rectification of habitats at the project site is a feasible strategy, therefore, creation or restoration of compensating habitats off-site is not necessary.

Preservation- Preservation of existing terrestrial habitats of equal or greater value at one or more off-site locations is also a potential compensating strategy for terrestrial impacts at Greenup. Preservation may be accomplished through acquisition, donation, conservation easements or similar legal mechanisms. Ideally, preserved habitats would themselves be threatened or serve to reduce the threat of impacts elsewhere. Where preservation is used as a mitigation strategy, impacted habitats are typically compensated at a greater than one to one value ratio by preserved habitats. For similar reasons to those discussed with respect to off-site creation or restoration, off-site preservation of compensating terrestrial habitats is not necessary or desireable.

7.0 FORMULATION OF MITIGATION ALTERNATIVES

Table 4 on the following pages summar ize the outcome of the technical evaluation of potential mitigation strategies. The discussion of alternative formulation will follow for two broad categories, terrestrial and aquatic habitats.

Terrestrial Habitat Mitigation Alternatives

Two proposed terrestrial habitat mitigation alternatives were formulated, based on varying combinations of the mitigation designs discussed previously for individual habitats (See Figure 2). Restoration of approximately 9 acres (4,000 lf) of River Bank habitat in accorda nce with the generalized bioengineering design would be a common feature to all alternatives due to the O&M restrictions on restoration options for this habitat type. The alternatives are based on differing, but equally valid ecological premises. Each al ternative is discussed in greater detail below.

Alternative A - Reforestation- Alternative A is based on restoring impacted terrestrial habitats to a condition reflecting its original forested condition. Historically, the project area was part of the extensive Mixed Mesophytic forest which once covered the Unglaciated Appalachian

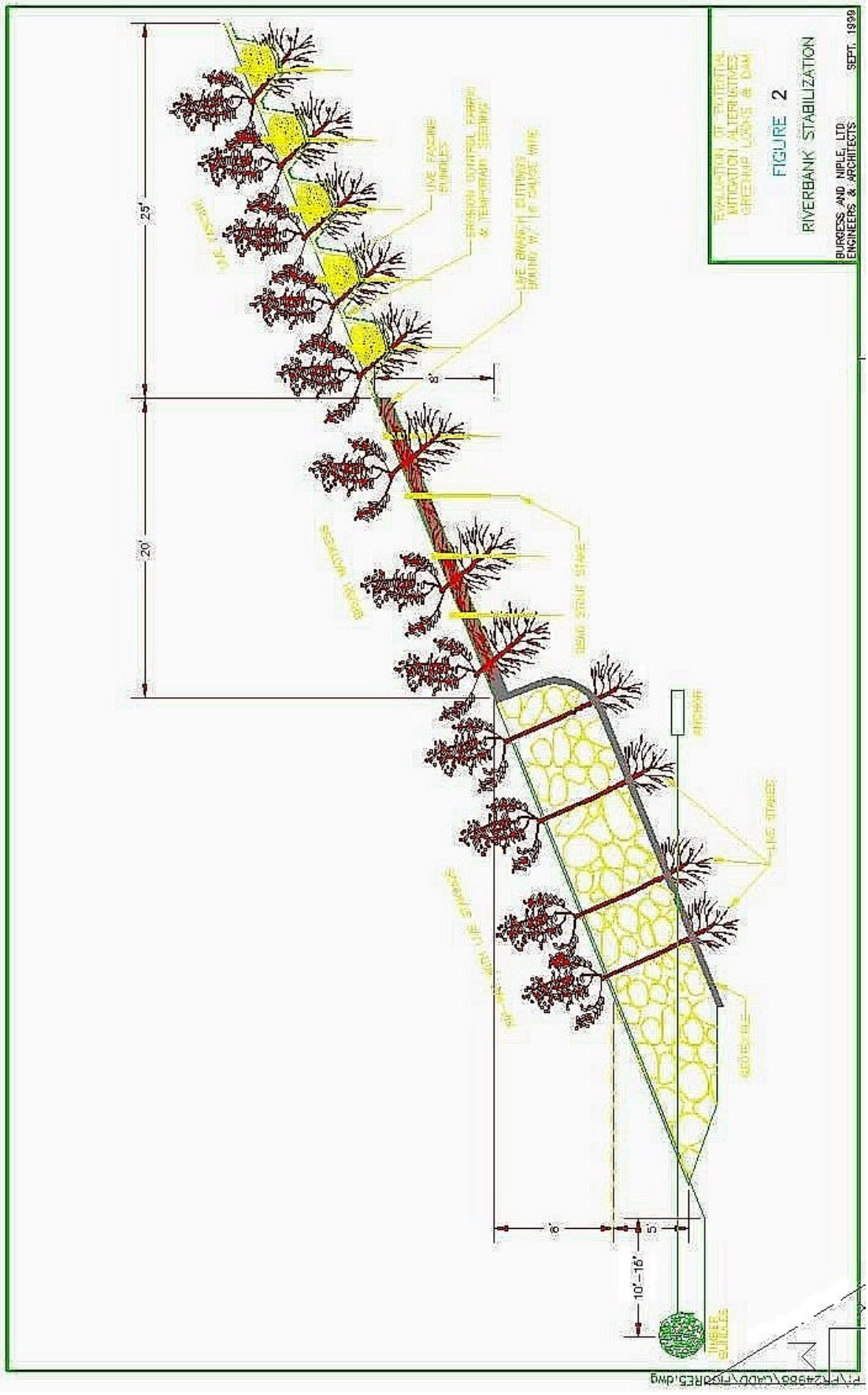
FIGURE 2
RIVERBANK STABILIZATION
BURGESS AND NIPLE, LTD.
ENGINEERS & ARCHITECTS
SEPT. 1999
25'
20'
8'
10'-16'
5'
6'

FIGURE 2

Plateau in a virtually unbroken community. Local species composition within this forest varied considerably depending upon topography, soils, and climatic influenc es. The project area would historically have been occupied by a floodplain or bottomland forest type, dominated by riparian and moist woods species such as sycamore, maples, elms, ashes, box elder, black walnut, butternut, and shagbark and shellbark hicko ries. Under this alternative, approximately 130 of the 139 acres of impacted terrestrial habitat would be restored to a forested condition approximating this original floodplain or bottomland forest. Restoration of the remaining 9 acres of River Bank habitat would be in accordance with the generalized bioengineering design. No Open Field Habitat would be restored. Implementation of this alternative would obviously favor forest dwelling species, in particular forest -dwelling birds benefited by extensive interior forested
acreage, such as the wood thrush, pileated woodpecker, and warblers. Such species are experiencing increasing habitat pressures as large forested tracts grow scarcer. Due to its location in a major river corridor, establishment of a lar ge continuous forested tract would also benefit migrating bird species, in particular the many species of migrating warblers. Local habitat diversity would be reduced under this alternative relative to baseline conditions, but habitat diversity would be enhanced on a macro scale by increasing forested acreage in an area generally dominated by agricultural land and other open habitats.

Alternative B - Restoration of Existing Habitats- Alternative B is based on restoring terrestrial habitat values in all th ree baseline habitat types. Under this alternative, approximately 68 acres of Riparian Forest habitat, 62 acres of Open Field habitat, and 9 acres of River Bank habitat would be restored in accordance with the proposed conceptual habitat designs discussed above. The proposed acreages for Open Field and Riparian Forest habitats are based on a division which optimizes available forested habitat within the limits of total site acreage while minimizing losses to Open Field species. River Bank habitat is held constant at 9 acres for the reasons previously discussed. Implementation of this alternative would essentially continue the baseline condition while optimizing the value of replacement habitats within the area of impact.

Aquatic Habitat Mitigation Alternatives

Two aquatic habitat alternatives were considered feasible to address impacts to habitats from construction of the 600' lock extension. These are tailwater dikes and constructed shallows. Similarly, two habitat alternatives were selected to addr ess the system-wide effects of traffic accomodation during maintenance scenerios throughout the Greenup system. These are notched dikes and T-dikes in the Meldahl navigation pool.

Tailwater Dikes- This alternative would consist of construction of two 1,000-foot parallel dikes in the restricted tailwater zone below the Greenup Dam. The baseline habitat type in this area is Lower Riverine, a habitat type that is not expected to be impacted. Therefore, construction of the dikes represents a compensating, r ather than a rectifying mitigation alternative, essentially substituting

TABLE 4

Evaluation Summary Matrix

POTENTIAL MITIGATION ALTERNATIVES FOR PROJECT IMPACTS

Greenup Locks & Dam

Impacts	Mitigation Objectives	Potential Strategies	Evaluation Summary
All impacts	Mitigate on-site		
	Enhance ecological diversity		
Aquatic Habitat Losses	Compensation	Instream Habitat Improvement Structures	
		Sills and Dams	Ineffective in large channels. Navigation hazard.
		Deflectors	Effective lengths infeasible. Navigation hazard
		Substrate Placement	Ineffective. Subject to rapid sedimentation.
		Random Rocks	Ineffective in large channels.
		Cover Structures	Feasible with protective structures.
		Submerged Dikes	Feasible in restricted navigation zones.
		Off-Channel Ponds, Coves, and Shallows	
		On-Site Creation	Feasible. Integrate with River Bank stabilization.
		Embayment Restoration	Conflicts with onsite mitigation objective.
Terrestrial Habitat Losses	Rectify/Compensate	Rectify Riparian Forest Habitat	Feasible strategy. Floodplain/bottomland forest most appropriate design.

Impacts	Mitigation Objectives	Potential Strategies	Evaluation Summary
		Revegetate Open Field Habitat	Feasible strategy. Introduce native warm season grasses.
		Bank Bioengineering Treatments	Feasible strategy. Riprap toe stabilization. Live stakes, live fascines and brushmattressing.
		Off-Site Creation/Restoration	Conflicts with on-site mitigation objective.
		Preservation	Feasible only off site. Conflicts with on-site mitigation objective.
Sedimentation Impacts	Minimize	Turbidity Curtains	Feasible strategy.
		Construction Practices	Feasible. Required in SWPPP.
Fish Losses	Compensate	Fish Stocking	Unnecessary and ineffective. No nonreproducing species affected. Natural recovery ecologically preferable.
		Monetary Compensation	Required by state law.
Queuing Impacts	Avoidance	Mooring Buoys	Feasible. Minimal adverse impacts from installation.
		Mooring Cells	Favored for operational reasons, but potential construction impacts outweigh benefits as a mitigation strategy.
Recreation Impacts	Rectify/Compensate	Restore Recreation Facilities	Feasible strategy. Planned.
		Handicap Angler Access	Insufficient information to evaluate. Location and safety issues.

habitat values attributable to the dikes for lost values ass ociated with impacts to Backwater and Upper Riverine habitats. For purposes of this analysis, the dikes are assumed to be continuous structures constructed of rock and rubble, and of nominal dimensions. Final height and configuration of the dikes, as well as the feasibility and appropriateness of angler access, are issues which must be resolved at a later phase in design, pending the outcome of site -specific hydraulic modeling studies and operational discussions regarding safety and maintenance access issues.

Constructed Shallows- Under this alternative, approximately 1.3 acres of protected shallows would be constructed at the toe of impacted River Bank areas. Construction of the protected shallow areas would be integrated with the overall generalized de sign for biostabilization of impacted bank areas. Timber bundles are proposed as the most available, cost-effective means of constructing a protective off-shore "berm" to deflect wave energy, and to encourage deposition and subsequent establishment of aqu atic and emergent vegetation in these constructed shallow areas. Timber bundles would be constructed of planks or large branches bound together with wire and anchored into the bank toe. Cover structures such as constructed fish ledges, submerged brush, r ootwads, or boulders could also be placed in these areas to enhance their habitat value, but are not assumed in the generalized design presented in this report. Final dimensions and placement of constructed shallows features would be determined in conjunction with final design of bank bioengineering treatments and based on a detailed assessment of future shoreline conditions.

T-dikes and Notch dikes- Areawide mitigation would include the construction of T -dikes and notch dikes for compensation of fish mor tality and fish reproduction impacts. The T -dike fields (a dike field is a series of dikes) would be located along the right descending bank of the Ohio River between River Miles 357.0 and 358.0. The notch dike field is to be placed along the right descending bank of the Ohio River between River Miles 366.5 and 368.5.

In general, the dikes are constructed of stone material positioned perpendicular from the River Bank into the main river channel. The T -dikes may be up to 50 feet long with a 3 to 1 slope and constructed at a minimum of 10 feet below normal pool elevation (See Figure 3). The notch dikes may be up to 70 feet long with a 3 to 1 slope and constructed at a minimum of 10 feet below normal pool elevation (See Figure 4). The notch width is at lea st 18 feet.

8.0 MITIGATION BENEFITS & COSTS

Benefits

Modified HEP procedures were used to assign Habitat Mitigation Unit (HMU) values to proposed habitat mitigation alternatives, and to assign Habitat Unit (HU) values to "future without project" habitat conditions for comparison with HMU values. For consistency, the same evaluation species, HEP models, and HU derivation procedures used to derive baseline HU values were used to assign both HMUs and "future without" HUs. HMUs and HUs were both derived using the same procedures (i.e., both are the product of HSI values and available habitat acreage); however, the term HMU is used to distinguish values assigned to proposed habitat mitigation alternatives.

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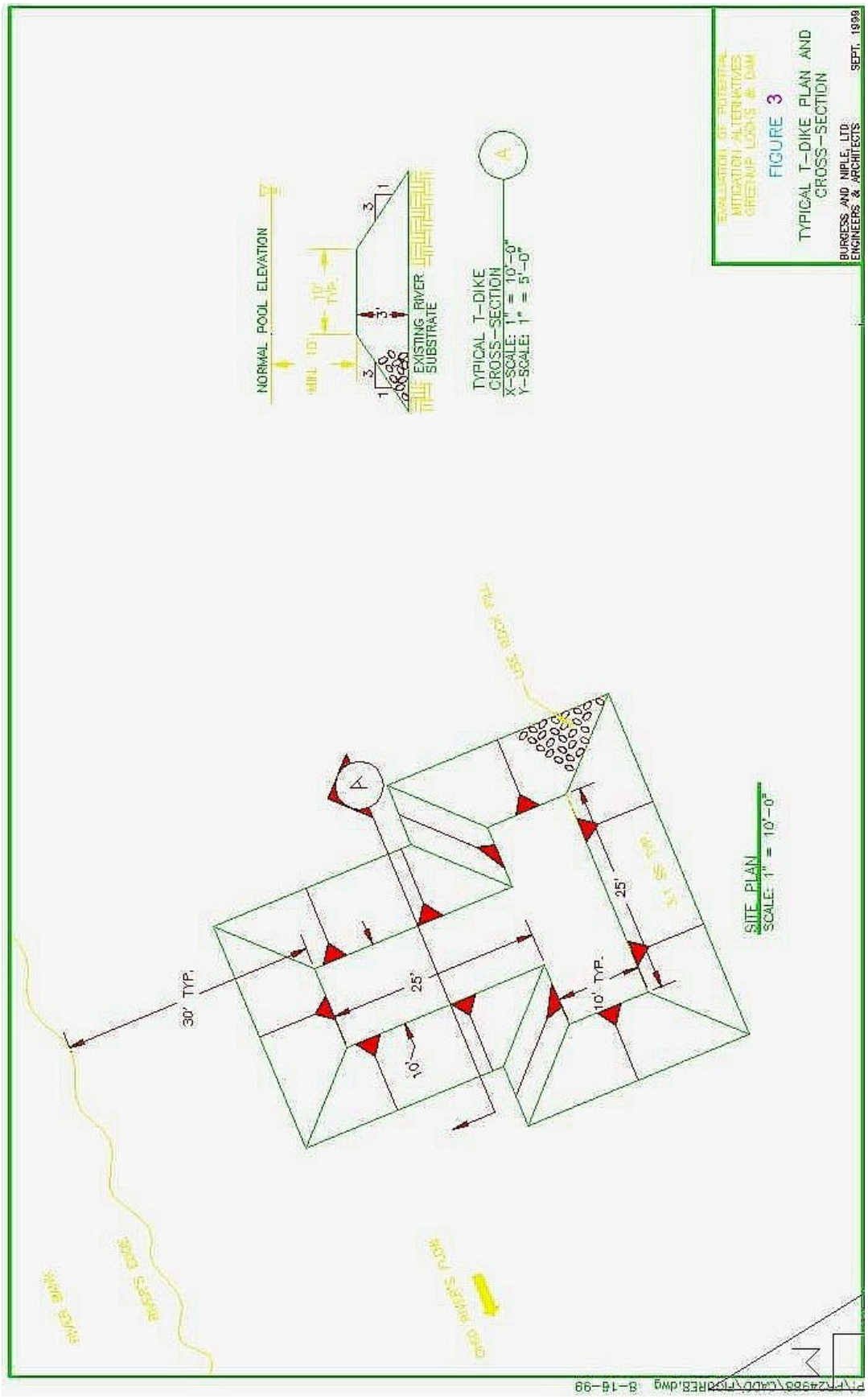

EVALUATION OF POTENTIAL MITIGATION ALTERNATIVES GREENUP LOCKS & DAM
FIGURE 3
TYPICAL T-DIKE PLAN AND CROSS-SECTION
BURGESS AND NIPLE, LTD ENGINEERS & ARCHITECTS
SEPT. 1998
NORMAL POOL ELEVATION
MIN. 10'
TYP.
3'
3
1
EXISTING RIVER SUBSTRATE
TYPICAL T-DIKE CROSS-SECTION
X-SCALE: 1" = 10'-0"
Y-SCALE: 1" = 5'-0"
A
SITE PLAN
SCALE: 1" = 10'-0"
30' TYP.
25'
10'
10' TYP.
25'
MOST RIVERS FLOW
8-18-99

FIGURE 3

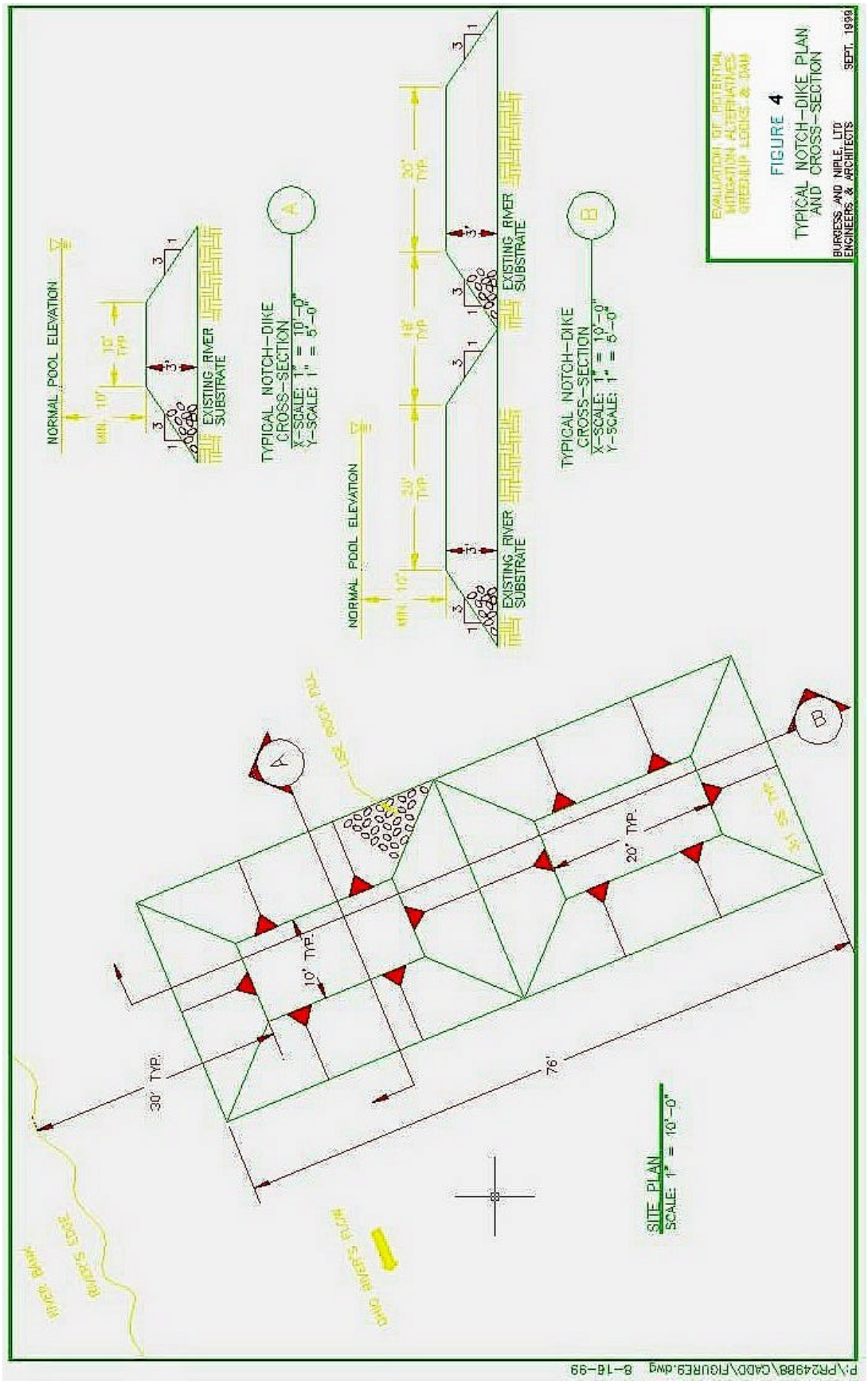

NORMAL POOL ELEVATION
MIN. 10'
15' TYP.
3
1
EXISTING RIVER SUBSTRATE
TYPICAL NOTCH-DIKE CROSS-SECTION
X-SCALE: 1" = 10'-0"
Y-SCALE: 1" = 5'-0"
A
B
20' TYP.
10' TYP.
30' TYP.
76'
SITE PLAN
SCALE: 1" = 10'-0"
EVALUATION OF POTENTIAL MITIGATION ALTERNATIVES GREENUP LOCKS & DAM
FIGURE 4
TYPICAL NOTCH-DIKE PLAN AND CROSS-SECTION
BURGESS AND NIPLE, LTD ENGINEERS & ARCHITECTS
SEPT. 1999
P:\PR2498B\CADD\FIGURE9.dwg 8-18-99

FIGURE 4

Mitigation objectives specify that one-to-one or greater replacement of lost HU values at the end of the period of analysis (55 years) is considered adequate for compensation of direct habitat losses. Therefore, projected HMU values for proposed habitat replacement alternatives were compared to projected "future without" HU values at the end of the period of analysis (Target Year [TY] 50).

As shown in Table 5, both proposed terrestrial habitat mitigation alternatives result in a net gain in HMUs at the end of the period of analysis when compared to both impacted HU values and "future without" HU values at the end of the period of analysis. Implementation of Alternative B (Restoration of Existing Habitats) results in the highest net gain of the two terrestrial mitigation alternatives with a net total cumulative HMU value of 2258.74 HMUs and 41.07 net average annual HMUs (AAHMUs) when compared to "future without" values at the end of the period of analysis. Alternative A (Reforestation) provides a net total cumulative HMU value of 2047.34 HMUs and a net AAHMU value of 37.22 AAHMUs when compared to future without values at the end of the period of analysis.

As shown in Table 5, all proposed aquatic mitigation alternatives show a slight net gain in HMUs when compared to projected TY 50 values for "future without" conditions at their respective proposed locations. Tailwater Dikes and Constructed Shallows results in the highest net gain with a net TY 50 value of 2.11 HMUs when compared to projected "future without" TY 50 HU values for the dam tailwaters. Tailwater Dikes alone result in the second highest net gain with a net TY 50 value of 1.89 HMUs. Constructed Shallows alone result in only a slight net gain of 0.224 HMUs when compared to "future without" values at their proposed location at the toe of the River Bank. Only those alternatives involving construction of tailwater dikes, show a net positive benefit when compared to the HU value of anticipated impacts (56.01).

These results reflect a number of effects attributable to the substitution of differing habitats and habitat features in proposed mitigation for aquatic habitat losses, to uncertainties regarding the benefits of aquatic mitigation structures, and from deficiencies inherent in the HEP analysis process itself. In the case of proposed aquatic mitigation alternatives, discrete aquatic habitat improvement structures (i.e., dikes, constructed shallows) located in Lower Riverine and Backwater habitats are proposed to compensate for habitat losses in Backwater and Upper Riverine habitats. High apparent net gains provided by construction of tailwater dikes when compared to impact HU values are attributable primarily to the larger area influenced by the dike structures when compared to constructed shallows, which are limited to shoreline areas. Apparent low net gains for proposed aquatic mitigation alternatives when compared to projected "future without"conditions reflect uncertainties regarding how the proposed structures influence individual HSI variables for selected evaluation species, and the site-specific focus of the HEP analysis procedure. For example, literature shows that the primary benefits of submerged dike structures are attributable to their introduction of structural diversity in the larger overall spatial arrangement of aquatic habitats rather than to improvements in specific microhabitat variables at their respective locations. Since HEP procedures focus on comparing baseline or "without project" conditions to "with project" conditions within specific habitats, impacts related to increased diversity and other effects among differing habitats is not well accounted for by HEP analysis.

Table 5
Assignment of HMU Values

Terrestrial Alternatives

Alternative A – Reforestation

Species	**Total Cumulative HUs**	**Total Cumulative HMUs**	**Net Cumulative HMUs**	**Average Annual HUs**	**Average Annual HMUs**	**Net Average Annual HMUs**
	Without Project	**With Project - Alternative A**		**Without Project**	**With Project**	
White-tailed deer	4144.75	6120.00	1975.25	75.36	111.27	35.91
Raccoon	3682.88	5183	1500.13	66.96	94.24	27.28
Red-tailed hawk	5627.83	3753.75	-1874.08	102.32	68.25	-34.07
Red-eyed vireo	2309.67	4214.85	1905.18	41.99	76.63	34.64
Pileated Woodpecker	859.99	2531.38	1671.39	15.64	46.03	30.39
Wood thrush	1621.50	4712.50	3091.00	29.48	85.68	56.20
Eastern box turtle	2585.00	5525.00	2940.00	47.00	100.45	53.45
Eastern meadowlark	4017.20	1121.25	-2895.95	73.04	20.39	-52.65
Meadow vole	3537.88	1145.63	0	64.33	20.83	-43.50
Eastern cottontail	3789	0	-3788.95	68.89	0.00	-68.89
Belted Kingfisher	408.38	369.00	-39.38	7.43	6.71	-0.72
Beaver	247.5	202.50	-45.00	4.50	3.68	-0.82
Totals	32831.51	34878.86	2047.34	596.94	634.16	37.22

(**Table 5 continued)**

Alternative B -Restoration of Existing Habitats

Species	**Total Cumulative HUs**	**Total Cumulative HMUs**	**Net Cumulative HMUs**	**Average Annual HUs**	**Average Annual HMUs**	**Net Average Annual HMUs**
	Without Project	**With Project - Alternative B**		**Without Project**	**With Project**	
White-tailed deer	4144.75	6468.75	2324.00	75.36	117.61	42.25
Raccoon	3682.88	4776.13	1093.25	66.96	86.84	19.88
Red-tailed hawk	5627.83	4676.00	-951.82	102.32	85.02	-17.31
Red-eyed vireo	2309.67	2408.03	98.37	41.99	43.78	1.79
Pileated Woodpecker	859.99	1324.11	464.11	15.64	24.07	8.44
Wood thrush	1621.5	2465	843.50	29.48	44.82	15.34
Eastern box turtle	2585.00	2890.00	305.00	47.00	52.55	5.55
Eastern meadowlark	4017.2	3460.20	-557.00	73.04	62.91	-10.13
Meadow vole	3537.9	3284.6	-253.25	64.325	59.72045455	-4.604545455
Eastern cottontail	3788.95	2765.91	-1023.04	68.89	50.29	-18.60
Belted Kingfisher	408.38	369	-39.375	7.425	6.709090909	-0.715909091
Beaver	247.5	202.5	-45	4.5	3.681818182	-0.818181818
Totals	32832	35090	2258.74	596.94	638.00	41.06805453

(Table 5 continued)
Aquatic
Alternatives

Alternative A – Tailwater Dikes										
	Baseline HUs			**Anticipated Impact HUs**			**HUs Without Project**		**HMUs With Project**	**Net HMUs**
							TY 55		**TY 55**	**TY 55**
	115.85			56.01			136.36		138.25	1.89

Alternative B – Constructed Shallows										
	Baseline HUs			**Anticipated Impact HUs**			**HUs Without Project**		**HMUs With Project**	**Net HMUs**
							TY 55		**TY 55**	**TY 55**
	115.85			56.01			4.205		4.429	0.22

Alternative C - Tailwater Dikes + Constructed Shallows										
	Baseline HUs			**Anticipated Impact HUs**			**HUs Without Project**		**HMUs With Project**	**Net HMUs**
							TY 55		**TY 55**	**TY 55**
	115.85			56.01			140.57		142.679	2.11

Sediment deposition usually occurs between the structures where current velocity is reduced relative to that in the unprotected main channel. Dikes create quiescence in areas that are similar to naturally occurring lentic habitats during normal and low flow (Beckett et al., 1983). In addition, the dikes themselves are a coarse -grained substrate used by aquatic insects and fishes (Conner et al., 1983; Penni ngton et al., 1983; and Shields, 1983).

Placement of river training structures, i.e., dikes, and modifications of existing structures have been widely practiced as techniques for improving and reclaiming aquatic habitat (Schmitt, 1983), particularly along smaller streams (Shields, 1983). The effectiveness of such efforts is related to the ability of the structures to produce depths, velocities, and substrates that increase overall physical habitat diversity and suitability. The effects of dikes are poorly understood but are generally considered to be beneficial to aquatic communities (U.S. AED, Omaha 1982; Burch et al., 1984). Robinson and Dillard (1977) reported on the utilization of dikes by certain fish in the Missouri River and found that habitats asso ciated with dikes supported the greatest number of fish, but that more species were taken from mud banks. Robinson (1980) also found that no single type of dike or modification was any better than any other for fish. Hesse and Newcomb (1982) also reported that many fish species were associated with dikes in the upper channelized reaches of the river. Atchison et al. (1986) studied the aquatic biota associated with dikes and revetments in the Middle Missouri and reported the catch and the number of species of fish to be quite high in the more diverse and protected habitats adjacent to dikes.

In conclusion, the literature is in general agreement that the macroinvertebrate and fish populations of flowing water systems respond primarily to microhabitat condit ions, including current speed, substrate type, temperature, dissolved oxygen, and turbidity, among others. Whether the appropriate conditions for any given species are provided by a revetment, by a natural sandbar, or by a dike is unimportant; it is the i mmediate physical -chemical surroundings which is important to the organism. River training activities, i.e., dikes, merely alter the spatial arrangement and perhaps the relative properties of habitats within the river as a whole.

For system-wide remedies such as the T-dikes and Notch Dikes a cumulative 0.75 site index (SI) for referenced species life stages was assigned to each individual dike within a dike field that contained less than 50 dikes per field. A cumulative 0.50 SI for referenced species life stages was calculated for each individual dike within a dike field that contained greater than 50 dikes per field. The decrease in SI for an increase in dikes was attributed to a net increase in water velocity and velocity disturbance, relative to a dike field that contains 50 or less dikes. In addition, a decrease in habitat diversity and fish abundance was expected.

Cost

The formulated mitigation strategies were subjected to feasibility level cost estimates in order to evaluate their justification and incrementally determine the appropriate level of treatment for each category. Table 6 summarizes the costs of each approach.

TABLE 6

Feasibility Cost Estimates
Mitigation Alternatives
Greenup Locks and Dam

Restoration of Riparian Forest Habitat (47 acres)

• Distribute/incorporate dredge spoil over 47 acres (approx. 20,000 cy spoiled on 12 acres)	
20,000 cy at $4.00/cy	$80,000
• Grade to preexisting contours	
227,480 sy (47 acres) at $0.25/sy	$56,870
• Plow (subsoil) and disk	
47 acres at$2,000/acre	$94,000
• Plant trees	
Bare root seedlings at 600/acre density	
600 seedlings at ($0.25 ea. +$1.50 ea. labor) = $1,050/acre	
47 acres at $1,050/acre	$49,350
• Watering	
By truck at 1,000 gals/acre = $55/acre x 47 acres	$2,585
• Weed control (assume one application)	
47 acres at $250/acre	$11,750
Subtotal reforestation establishment costs	$294,555
20% Contingency	$58,910
Total reforestation establishment costs	$353,465
• Operation and Maintenance (including replanting,monitoring,forest management, and cost increases over 50 year life of project)	$163,000
20% Contingency	$32,600
Subtotal reforestation O&M costs	$195,600
Reforestation total (47 acres)	**$549,065**
Reforestation establishment unit cost (per acre)	**$7,520/acre**
Reforestation O&M unit cost (per acre)	**$4,160/acre**

Revegetation of Open Field Habitat (83 acres)

• Plow (subsoil) and disk	
83 acres at $2,000/acre	$166,000
• Weed Control (one application prior to seeding)	
83 acres at $250/acre	$20,750

- Seed with warm/cool season grass mix
  Hydroseed 83 acres
    Labor and equipment at $150/acre x 83 acres = $12,450
    Seed at $30/lb PLS x 10 lbs/acre x 83 acres = $24,900 — $37,350

  Subtotal open field establishment — $224,100
  20% contingency — $44,820
  Total open field establishment costs — $268,920

- Operation and maintenance (including monitoring, semiannual mowing and cost increases over 50 year life of the project) — $25,000
  20% Contingency — $5,000
  Subtotal open field O&M costs — $30,000
  $298,920

  Open Field total (83 acres)

  Open field establishment unit cost (per acre) — **$3,240/acre**
  Open Field O&M unit cost (per acre) — **$360/acre**

Bioengineered River Bank Restoration (4,000 lf or 9 acres)

- Riprap toe stabilization (4,000 lf x 30 ft x 6.5 ft)
  Excavation: approx. 30,000 cy at $8/cy — $240,000
  Riprap 30,000 cy at $55/cy — $1,650,000
  Geotextile: approx. 15,600 sy at $1.00/sy — $15,600

- Live stakes (joint plantings)
  Approx. 3500 stakes at $2.50/stake — $8,750
- Live fascines at $10/lf x 4,000 lf x 5 trenches — $200,000
- Brush matresses: assume same as live fascine installation — $200,000

  Subtotal river bank establishment costs — $2,314,350
  20% contingency — $46,2870
  Total river bank establishment costs — $2,777,220

  Operation and Maintenance (including monitoring, maintenance cutting and cost increases over 50 year life of project) — $72,000
  20% Contingency — $14,400
  Subtotal river bank O&M — $86,400

  River Bank bioengineering total (9 acres) — **$2,863,620**

  River Bank establishment unit cost (per acre) — **$308,580/ac**
  River Bank O&M unit cost (per acre) — **$9,600/acre**

Alternative A – Reforestation

Establish 130 acres Riparian Forest at $7,250 per acre	$977,600
Riparian Forest O&M at $4,160 per acre	$540,800
Establish 9 acres River Bank at $308,580 per acre	$2,777,220
River Bank O&M at $9,600 per acre	$86,400
Total Alternate A	**$4,382,020**

Alternative B – Restore Existing Acreages

Establish 67 acres Riparian Forest at $7,250 per acre	$511,360
Riparian Forest O&M at $4,160 per acre	$282,880
Establish 9 acres River Bank at $308,580 per acre	$2,777,220
River Bank O&M at $9,600 per acre	$86,400
Establish 62 acres Open Field at $3,240 per acre	$200,880
Total Alternate B	**$3,880,440**

Tailwater Dikes (two dikes at 1,000 lf each)

• 20 ft w x 10 ft h x 2,000 lf /27 = 14,800 cy at $125 cy (purchased rock plus barge placement)	$1,850,000
Subtotal	$1,850,000
20% contingency	$370,000
Tailwater dike total (2,000 lf)	**$2,220,000**
Tailwater dike unit cost (per lf)	**$1,110/lf**

Notch Dikes

Rockfill 123 cubic yard at $125 per cubic yard, placed	$15,375 ($16,000)

T-Dikes

Rockfill 134 cubic yard at $125 per cubic yard, placed	$16,750 ($17,000)

9.0 INCREMENTAL ANALYSIS AND COST EFFECTIVENESS

The U.S. Army Corps of Engineers, Huntington District is assessing alternative mitigation plans for adverse environmental impacts anticipated to result from modification of the Greenup Locks and Dam on the Ohio River. Adverse impacts include degradation and loss of (1) terrestrial habitat, including riparian forest, river banks, and open fields and (2) aquatic habitat in the Ohio River. Two alternative mitigation plans have been formulated for adverse terrestrial impacts, and three mitigation alternatives have been developed for aquatic habitat impacts.

The purpose of this investigation is to conduct cost effectiveness and incremental cost analyses (CE/ICA) to help identify the most effective and efficient mitigation plans for Greenup Locks and Dam. CE/ICA typically does not identify a single optimal plan. However, it does aid decision making by identifying those plans that are the most efficient and effective means to achieve different mitigation levels.

Mitigation planning differs from traditional U.S. Army Corps of Engineers (Corps) planning studies, since mitigation outputs typically cannot be expressed in monetary terms. In practice, Corps mitigation studies often measure the ecosystem effects of alternative plans in terms of physical dimensions, population counts, or various habitat-based scores. To promote effective decision making for environmental mitigation, Corps environmental planning has incorporated CE/ICA to compare relative costs and outputs of alternative mitigation plans. Corps mitigation policies (such as those outlined in ER 1105-2-100, *Guidance for Conducting Civil Works Planning Studies*) require that mitigation projects include CE/ICA to inform decision making by evaluating possible combinations of management measures. Specifically, CE/ICA can be used to support mitigation planning through: (1) formulation of alternative plans, (2) evaluation of their effects, and (3) identification of plans which best meet mitigation objectives at least cost.

CE/ICA generates information that supports sound financial investments by comparing costs and non-monetary outputs of alternative investment choices. CE/ICA is conducted in a series of steps that progressively identify alternatives that meet specified criteria and screen out those that do not. These analyses help determine whether additional environmental outputs for increasing levels of mitigation are worth the additional monetary cost. Although neither cost effectiveness nor incremental cost analysis necessarily result in identification of a single "best" alternative, the analyses contribute to informed decision making for environmental mitigation.

As shown in Figure 1, CEA evaluates the full range of alternative plans. For environmental projects, outputs are typically expressed in physical units (e.g., hydrologic indicators) or biological units (e.g., habitat units). There may be many plans that could generate a particular level of mitigation. These plans may be comprised of one or more structural or nonstructural measures. CEA begins with a comparison of costs and outputs of alternative plans to identify the least cost plan for every possible level of mitigation. CEA screens out plans that are inefficient or ineffective. Figure 2 illustrates how inefficient and ineffective plans are eliminated through CEA. As shown in this figure, Plan A produces the same level of mitigation as Plan B, but at a higher cost. Plan A is therefore inefficient relative to Plan B and would be eliminated through the CEA process. Comparison of Plan C and Plan D indicates

that Plan D produces more environmental outputs than Plan C at the same cost. Plan C is therefore ineffective relative to Plan D and would also be eliminated by the CEA process. The result of CEA is a cost effectiveness curve that consists of the most economically efficient plans for various levels of mitigation (see Figure 3).

After the cost effectiveness of the alternatives has been established, ICA can be used to reveal and evaluate incremental changes in costs for increasing levels of mitigation. The primary purpose of ICA is to explicitly compare incremental costs and incremental outputs associated with each successively larger mitigation plan (see Figure 4). Explicit comparisons of incremental costs and outputs allow evaluation of alternative scales o f plans and plan components. Incremental evaluation of project costs and outputs provides more insight than average or total costs, since it can be used to identify significant increases in project costs necessary to achieve additional units of mitigation for the full range of mitigation plans. While ICA does not typically identify the "best" plan, it does provide information to decision makers which allows explicit comparisons between relative changes in costs and outputs for each plan.

IWR-PLAN DECISION SUPPORT SOFTWARE

The Corps Institute for Water Resources has developed a computer model, *IWR-PLAN*, to facilitate incorporation of CE/ICA into the environmental planning process. This software builds upon previous Corps CE/ICA efforts, such as (1) Evaluation of Environmental Investments Procedures Manual, Interim: Cost Effectiveness and Incremental Cost Analyses, May 1995, IWR Report #95-R-1 and (2) the ECO-EASY software which provided an earlier version of the model in DOS format.

IWR-PLAN can be used to: (1) formulate alternative plans by evaluating potential combinations of mitigation measures and a variety of scales of individual measures, (2) perform cost effectiveness analysis of the spectrum of potential mitigation plans, and (3) conduct incremental cost analysis on cost effective plans. Costs and outputs associated with each plan are input by users. Users specify structural or nonstructural management measures, plans (combinations of measures); or programs (combinations of plans often at the r egional or national level), and potential scales of each measure.
The software combines these solutions into alternative plans. Users specify relationships between measures, including their combinability and exclusivity. *IWR-PLAN* then

FIGURE 1 (CONCEPTUAL)
ALL PLANS

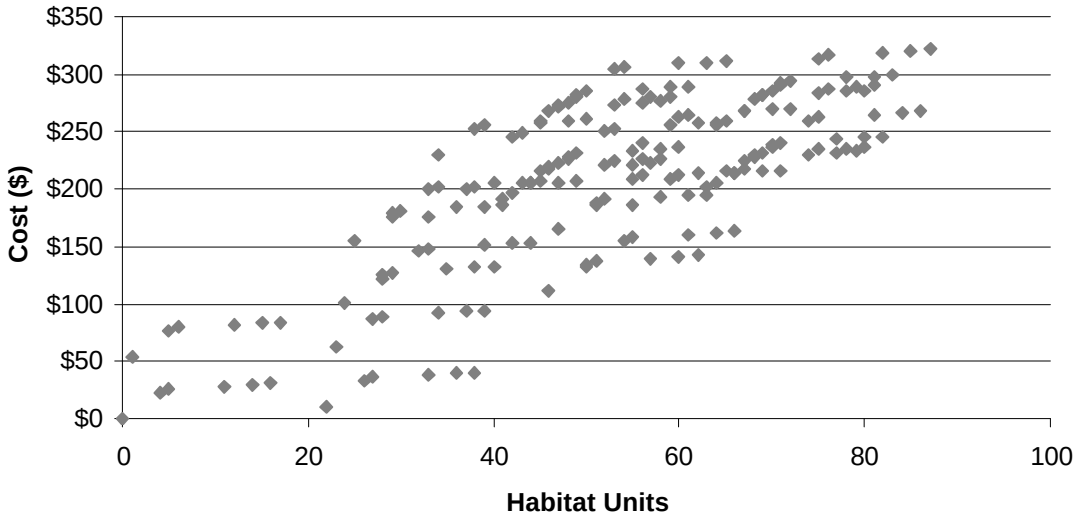


FIGURE 2 (CONCEPTUAL)
CEA SCREENING OF PLANS

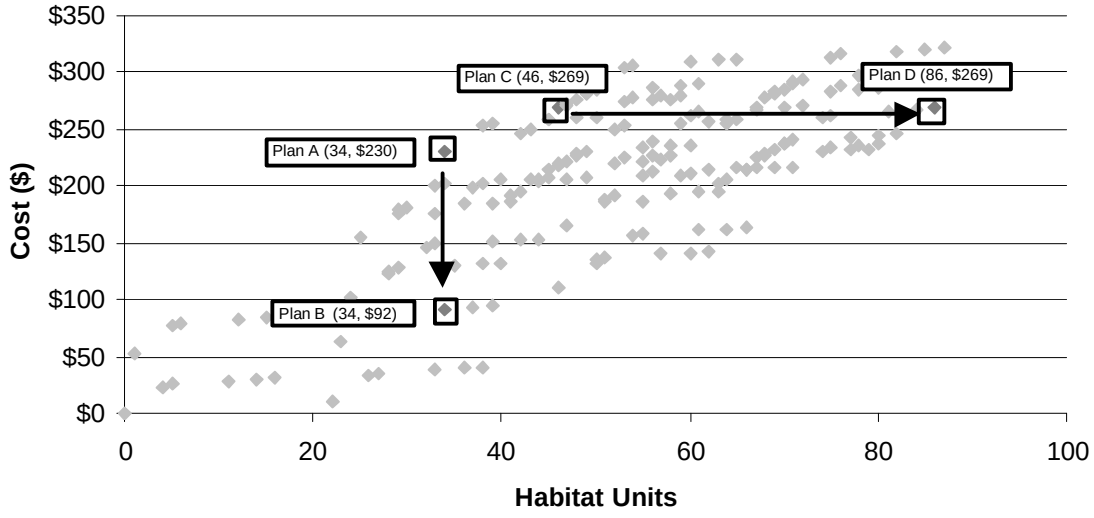


FIGURE 3 (CONCEPTUAL)
RESULTS OF CEA ANALYSIS

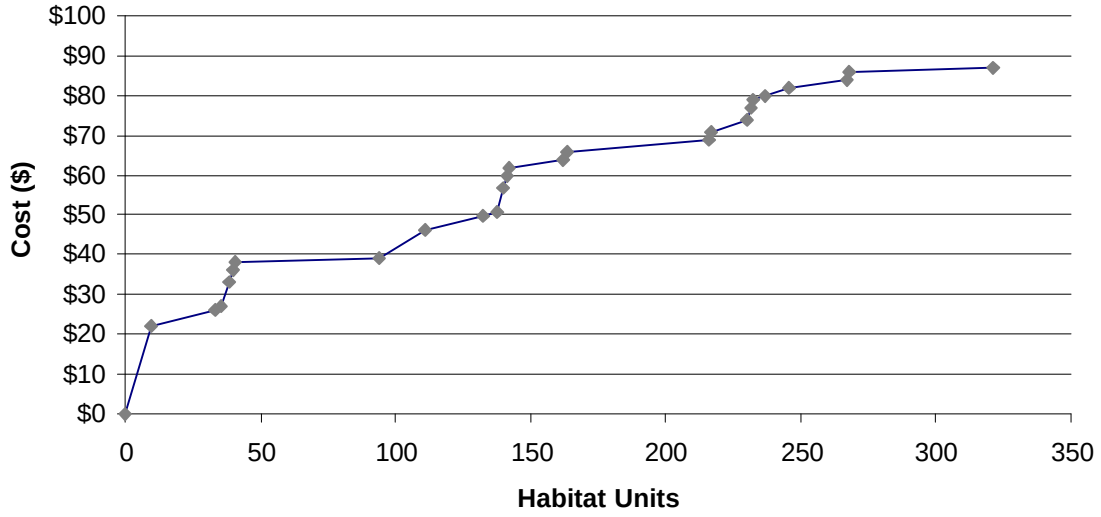
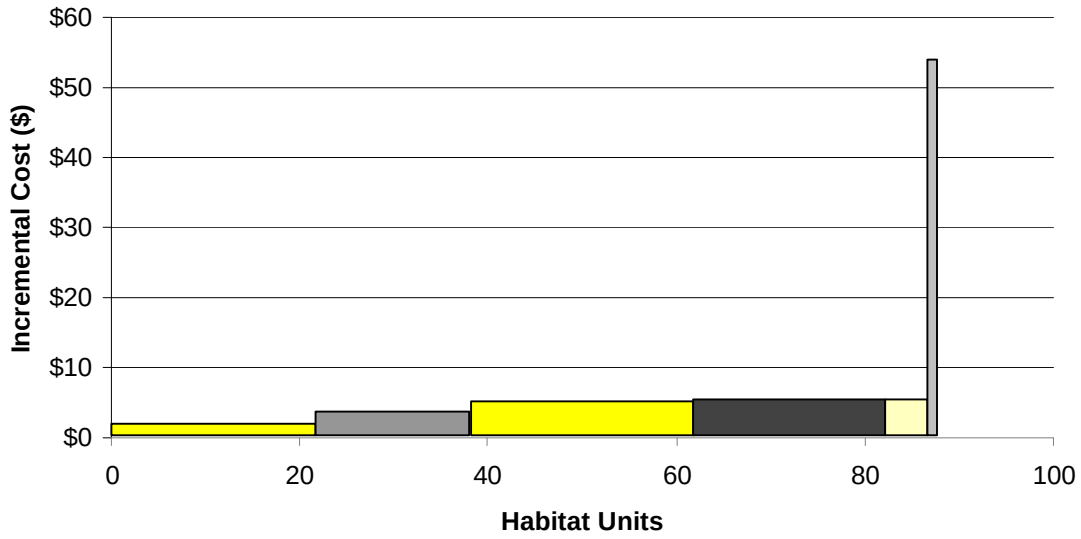


FIGURE 4 (CONCEPTUAL)
RESULTS OF ICA - BEST BUYS



identifies the best financial investment through CEA and ICA. Each combination of measures comprises an alternative plan. If alternative plans have already been formulated outside of *IWR-PLAN*, users can bypass the routine for building plans and still use *IWR-PLAN* to assist in identifying those plans that are the best investments. Multiple scenarios can be examined from a single set of input data. Scenarios may differ regarding the decision variables to be included in CEA, mitigation measures to be included, sensitivity values to be used, constraints to be applied, and plans to be included in the analysis.

ALTERNATIVE MITIGATION PLANS

It is anticipated that during the modification of the Greenup Locks and Dam most of the on-site terrestrial and aquatic habitats would be degraded or lost. For example, terrestrial habitat losses are expected to approach 100% during construction through: (1) installation of a concrete batch plant, (2) dredge material disposal, and (3) other construction activities. The alternative mitigation plans are intended to mitigate habitat loss and degradation associated with construction activities. The anticipated environmental effects of the alternative mitigation plans for Greenup Locks and Dam are summarized in Table 7. As indicated in this table, two terrestrial habitat mitigation plans and three aquatic habitat mitigation plans were formulated for Greenup Locks and Dam. The letter designations of terrestrial and aquatic mitigation plans do not imply that the plans are linked (i.e., Terrestrial Alternative A is unrelated to Aquatic Alternative A).

TABLE 7
ANTICIPATED EFFECTS (HUs) OF
ALTERNATIVE MITIGATION PLANS*

	Alternative Plans			
	Baseline	**A**	**B**	
Terrestrial Habitat	32831.51	34878.85	35090.25	

		A	**B**	**C**
		138.25	4.429	142.679
		(136.36)	(4.205)	(140.565)

* The aquatic mitigation alternatives are unrelated to the terrestrial mitigation alternatives.

The anticipated effects of the alternative mitigation plans in Table 7 were estimated using Habitat Evaluation Procedures (HEP), which combines ecosystem quality and quantity into a single parameter, habitat units (HUs). The HUs contained in Table 7 represent the ultimate habitat quality at the end of the 55-year period of analysis (i.e., TY55).

As indicated in Table 7, the effects of the two terrestrial mitigation alternatives on riparian forest, river bank, and open field habitats are expected to result in net increases in total site HUs relative to the baseline condition. However, some of the mitigation plans are anticipated to result in net losses of specific terrestrial habitat types (i.e., riparian forest, river bank, open field).

The three aquatic mitigation alternatives also differ significantly in scope and scale. Alternative A includes the construction of two 1,000-foot parallel tailwater dikes influencing 70 acres of lower riverine habitat. Alternative B would involve constructed shallow with approximate dimensions of 4,000-feet long and 15-feet wide with a total 60,000 square feet or 1.3 acres. Alternative C combines the first two alternatives. Given the variable scope of the

aquatic mitigation plans, the without -project (baseline) conditions for the three alternatives differ (see Table 7).

Implementation costs associated with the Greenup Locks and Dam terrestrial and aquatic mitigation plans are summarized in Table 8. This table includes unit costs for terrestrial and aquatic mitigation, the number of units associated with the mitigation alternatives, and total costs of each plan. The implementation costs include engineering, design, construction, and operation and maintenance As indicated in the table, among the terrestrial mitigation plans, Alternative B is the least expensive mitigation plan, and Alternative A is the m ost expensive. For the aquatic mitigation alternatives, Alternative A is much more expensive than Alternative B, and the most expensive plan is Alternative C, which is a combination of the first two plans.

TABLE 8

COSTS OF ALTERNATIVE PLANS

		Numbe r of Units**	
Terrestrial Habitat Mitigation			
Alternative A			
RiparianForest (constr)	$7,520	130	$977,600
Riparian Forest (O&M)	$4,160	130	$540,800
River Bank (constr)	$308,580	9	$2,777,220
River bank (O&M)	$9,600	9	$86,400
Total		139	$4,382,020
Alternative B			
Riparian Forest (constr)	$7,520	68	$511,360
Riparian Forest (O&M)	4,160	68	$282,880
River Bank (constr)	$308,580	9	$2,777,220
River Bank (O&M)	9,600	9	$86,400
Open Field (constr)	$3,240	62	$200,880
Open Field (O&M)	$350	62	$21,700
Total		139	$3,880,440
Aquatic Habitat Mitigation			
Alternative A	$1,110	2,000	$2,220,000
Alternative B	$10	4,000	$40,000
Alternative C	**$1,120**	6,000	**$2,260,000**

* Mitigation unit costs are $/acre for ter restrial habitat and $/linear foot for aquatic habitat.
** Mitigation units are acres for terrestrial habitat and linear feet for aquatic habitat.

GREENUP LOCKS AND DAM CE/ICA

Table 9 presents cost and mitigation output profiles for the four terrestrial mitigation plans and the three aquatic mitigation alternatives. This table includes expected net gains in total habitat units of the alternative mitigation plans relative to future without -project (baseline) conditions. The terrestrial and aquatic mitiga tion plans are listed in order of increasing gains in HUs. For each mitigation plan, construction first costs are presented as current values and as average annual costs estimated using the prevailing Federal discount rate (6.875%) applied over the 50-year project life. Average costs per HU are also included. For terrestrial mitigation, Alternative A would provide the lowest average annual mitigation

cost per HU, and Alternative D would provide the highest. For aquatic mitigation, Alternative B would provide the lowest average annual mitigation cost per HU, and Alternative A would provide the highest.

COST EFFECTIVENESS ANALYSIS

Using *IWR-PLAN*, the Greenup Locks and Dam CEA determined the most economical plans that would yield specific levels of mitig ation. All of the alternative mitigation plans (terrestrial and aquatic) were found to be cost effective and were carried forward to ICA.

TABLE 9
COST AND OUTPUTS OF ALTERNATIVE MITIGATION PLANS

Alternative Plans	Net Gain in HUs	Construction Costs ($)	Avg. Annual Cost ($)*	Average Cost ($/HU)
Terrestrial Mitigation Alternatives				
No Action	0.00	$0	$0	n/a
B	41.07	$3,880,440	$276,740	$6,738
A	37.22	$4,382,020	$312,511	$8,396
Aquatic Mitigation Alternatives				
No Action	0.00	$0	n/a	n/a
B	0.22	$2,220,000	$2,853	$12,737
A	1.89	$40,000	$158,323	$83,769
C	2.11	$2,260,000	$161,176	$76,242

* Average annual costs are based on 6.875% discount rate and 50 -year project life.

INCREMENTAL COST ANALYSIS

IWR-PLAN was also used to compare the incremental costs and the incremental outputs associated with moving to each successively larger mitigation plans. Table 10 presents the intermediate results of the Greenup Locks and Dam ICA, which include the outputs and total costs for each of the cost effective mitigation plans, as well as their incremental outputs, average costs, and incremental costs. Incremental costs were calculated by subtracting the cost of the last alternative under consideration from the cost of the next largest plan. Incremental outputs were calculated by subtracting the output of the last alternative under consideration from the output of the next largest plan.. Incremental costs per unit of additional output were calculated by dividing incremental cost by incremental output.

Table 10
Intermediate Greenup Locks and Dam ICA Results

			Average Cost ($/HU)	Incremental Output (HUs)		Incremental Cost per Incremental Output ($/HU)
Terrestrial Mitigation Plans						
No Action	0.00	$0	n/a	$0	n/a	$0
B	41.07	$276,740	$6,738	$276,740	41.07	$6,738
A	37.22	$312,511	$8,396	$35,771	-3.85	$9,291
Aquatic Mitigation Plans						
No Action	0.00	$0	n/a	$0	$0	$0
B	0.22	$2,853	$12,737	$2,853	0.22	$12,737
A	1.89	$158,323	$83,769	$155,470	1.67	$93,319
C	2.11	$161,176	$76,242	$2,853	0.22	$12,737

The final step in the incremental cost analysis is to eliminate plans that result in higher incremental costs per unit of output than larger plans. For example, among the aquatic mitigation plans, Alternative A has higher incremental costs than Alternative C. After these plans have been eliminated, incremental costs per unit of output are then recomputed for the remaining plans.

The next step in the overall analysis compares incremental costs and outputs of each plan to the no action plan (i.e., without -project conditions). This process identifies the plan that produces the lowest incremental cost per unit of output when compared to the no action plan. In the next step, all larger plans are compared incrementally to the lowest average cost plan. This process identifies the most efficient plan for producing the next higher level of output. All plans between the first and second selected plans are then eliminated. Incremental costs for the remaining larger plans are recalculated compared to the second selected plan. The successive comparison of incremental costs to the previously selected plan continues until the set is complete. The final set of selected plans is referred to as "best buy plans". The first "best buy" is the most efficient plan, producing ecological outputs at the lowest incremental cost per unit. If a higher level of output is desired for reasons other than cost efficiency, then successive "best buy" plans can be considered for implementation.

The results of the Greenup Locks and Dam ICA are shown in Table 11. As indicated in this table, for the proposed modification of Greenup Locks and Dam, terrestrial mitigation Alternative B and aquatic mitigation Alternatives B and C have been identified through ICA as "best buy" plans. Of the terrestrial and aquatic mitigation alternatives considered for Greenup Locks and Dam, these plans have the lowest costs per unit of ecological output.

TABLE 11
GREENUP LOCKS AND DAM ICA RESULTS - BEST BUY PLANS

Alternative Plans	Net Gain in HUs	Cost ($)	Average Cost ($/HU)	Incremental Cost ($)	Incremental Output (HU)	Incremental Cost per Output ($/HU)
Terrestrial Mitigation Plans						
B	41.07	$276,740	$6,738	$276,740	41.07	$6,738
Aquatic Mitigation Plans						
B	0.22	$2,853	$12,968	$2,853	0.22	$12,968
C	2.11	$161,176	$76,387	$158,323	1.89	$83,769

SYSTEM-WIDE MITIGATION COST EFFECTIVENESS

System or areawide impacts from accomodated tow traffic during maintenance outages will be analyzed separately below as the habitat values associated with this category of impact and mitigation valuation is based on a different system.

Three mitigation measures were considered during areawide mitigation investigation: (1) 25 dikes per dike field, (2) 50 dikes per dike field, and (3) 100 dikes per dike field. Descriptions of these mitigation measures associated units, and ecological outputs are contained in previous sections of this report.

Table 12
Incremental Cost Analysis
Greenup Locks and Dam

Solution	NAVPATHUs	Cost($)	Avg. Cost ($/NAVPATHUs	Incremental Cost	Incremental Output (NAVPATHUs)	Incremental Cost Per Output
No Action	0	$0	$0	$0	0	$0
Alternative No. 1	937.5	$800,000	$853	$800,000	937.5	$853
Alternative No. 2	11875.0	$1,600,000	$853	$800,000	937.5	$853
Alternative No. 3	2500.0	3,200,000	$1,280	$1,000,000	625.0	$2,560

Output and costs for the management measures identified for the areawide mitigation project is shown in Table 12 above. The costs displayed in this table include construction costs only. For this CEA/ICA, operations and maintenance costs for the alternative plans under consideration were assumed to be equivalent. The outputs are expressed in terms of NAVPATHUs. As indicated in this table, the three measures described above generat ed four possible solutions, including the "No Action" alternative.

Table 13
Solutions, Costs, and Outputs
Greenup Locks and Dam

Solutions	Measures	Total Cost	Outputs (NAVPATHUs)	Average Cost/ NAVPATHUs
No Action	None	$0	0	$0
Alternative No. 1	25 dikes/dike field	$800,000	937.5	$853
Alternative No. 2	50 dikes/dike field	$1,600,000	1875.0	$853
Alternative No. 3	100 dikes/dike field	$3,200,000	2500.0	$1,280

A cost-effectiveness analysis (CEA) was conducted for the areawide mitigation to determine the most economical plans that would yield specific levels of compensation. As indicated in Table 13, the four plans under consideration are associated with only the compensation levels: 937.5, 1,875.0, and 2,500.0 NAVPATHUs. Alternative Nos. 1, 2, and 3 are obviously the most economical means of generating these output levels.

An incremental cost analysis (ICA) for the areawide mitigation project was also conducted. As indicated in Table 12, the ICA considers the incremental costs and outputs between "No Action" and Alternative Nos. 1, 2, and 3. As indicated in this table, the incremental cost per unit output of Alternative No. 1 is per NAVPATHUs, and the incremental cost per unit output of Alternative 3 is $2,560 per NAVPATHUs.

The cost-effectiveness and incremental cost analyses for the mitigation options indicate that all three alternatives are cost -effective for the output levels under consideration. Although incremental cost analysis cannot identify a single optimal plan, the analysis indicates that the incremental costs per unit of output for Alternative No. 3 ($2,560) is approximately 3 times more than those of Alternatives 1&2. In addition, Alternative No. 1 provides 37% of the compensation of the NAVPATHUs as compared to Alternative No. 2 that provided 75.9% of compensation for impacted NAVPATHUs.

10.0 Conclusion

Construction of the proposed lock improvements would result in unavoidable direct losses of both terrestrial and aquatic habitat. Direct habitat losses would result primarily from land clearing, dredging, blasting, and excavation activities. All terrestrial habitats within the CWL may be considered exposed to removal or other adverse impacts. Approximately 17 acres of backwater aquatic habitat and approximately 1 acre of upper riverine aquatic habitat would also be lost to dredging, rock excavation, and blasting activities. Adverse impacts resulting from accommodated navigation traffic can be expected from increased velocity and substrate disturbances to fish from additional tow passages and increases in the number of juvenile fish entrained in propellers.

Mitigation objectives for direct terrestrial habitat losses call for rectification or compensation of impacted habitats with replacement habitats of at least equal HU value when compared to without project conditions. Restoration of Existing Habitats (Terrestrial Habitat Alternative B) would result in a net gain habitat values over the 50-year study period. Under this plan, the proportion of woodland habitat would increase slightly for the site at the expense of openfield habitats which are the more common land-use for the Ohio River floodplain in the vicinity of Greenup L&D. This alternative would require the development of 68 acres of managed riparian forest, 62 acres of warm-season grassland and 9 acres of bioengineered river bank as described in Section 6.0. The plan meets the objective, representing a high value in terms of habitat and cost per habitat unit.

The aquatic mitigation plan shows a slight net gain in HMUs when compared to without project conditions during the 50-year study period. Tailwater dikes and constructed shallows are proposed to compensate for site-specific habitat impacts. Similar gains would be expected for T-dikes and notch-dikes proposed as mitigation for traffic effects in the Greenup and Meldahl pools. The tailwater dike feature would consist of two 1,000-foot parallel dikes in the restricted tailwater zone below the Greenup Dam. A gravel skirt would be employed along portions of the dikes for invertebrate colonization. Final height and configuration of the dikes would depend on hydraulic and operational considerations undertaken during the detailed design phase of the project while preserving habitat values for the structure. The constructed shallows would be integrated with the overall design for biostabilization of impacted riverbank areas. Approximately 1.3 acres of protected shallows would be required to meet the mitigation objective. Mitigation for accommodated navigation traffic throughout the system would include the construction of T-dike and notch dike fields (a dike field is a series of dikes) for compensation of fish mortality and fish reproduction impacts. The description of these features is found in Sections 6.0 and 7.0.

The total cost of the mitigation package is expected to be approximately $3.6 million. This represents savings through lock extension activities that complement and facilitate mitigation implementation and is a high value for complete restoration of lost habitat values. Further, the restored habitats would establish a more diverse habitat mix than would be expected for the without project conditions.

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APPENDIX G

MYERS MITIGATION PLAN AND INCREMENTAL ANALYSIS

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Incremental Analysis - On-site, Terrestrial Resources Mitigation, John T. Myers L&D Auxiliary Lock Extension

1.0 INTRODUCTION

The Louisville District has examined the potential terrestrial effects associated with the without project condition, Structural Plans 3 and 4, and Disposal Plans 1A, 2Aand B, and 3A and B. Structural Plans 3 and 4 produce similar effects, different only in th at Plan 4 is phased, so that some of the impacts (Phase 2) would occur approximately 20 years after the initial construction (Phase 1). Phase 2 consists of construction of an auxiliary filling system intake and culvert, which, in the case of Structural Plan 3, would be part of a single-phase lock extension project. Since impacts would be substantively the same for Structural Plans 3 and 4, no distinction is made in this incremental analysis. Mitigation is potentially necessary for two general project activities: material disposal and lower approach bank shaving/shaping.

Either Structural Plan would be paired with a disposal plan to constitute the complete project. Mitigation for disposal plans was built into the concept plans for post-construction restoration. For comparative purposes, two restoration plans were conceived for each of three potential disposal areas. For Area 1, one restoration alternative was eliminated, as infeasible, during the screening process. Therefore, only Disposal Plan 1A is a ddressed, herein. Two alternative restoration plans are addressed for each of disposal areas 2 and 3.

Lower approach bank shaving/shaping may be required to provide safe approach and departure of tow boats. This activities would destroy a quantity of ri parian forest.

Mitigation for disposal activities and lower approach bank shaving/shaping are addressed in the following sections. The tools used in this assessment included a habitat analysis for each of the proposed alternatives using either the Habita t Evaluation Procedures (HEP) or the Waterfowl Assessment Methodology. The findings of the habitat evaluation allow the comparison of the impacts between the Restoration Alternatives A and B for each of Alternative Disposal Areas 1 through 3 as well as to the No Action Alternative. These findings are preliminary and must be validated in PED.

2.0 ALTERNATIVES CONSIDERED

J.T. Myers Locks and Dam would be upgraded by constructing an extension of the existing 600-foot lock to provide an additional 1,200-foot lock. Construction activities would also include: removal of an approximate 2,100-foot long portion of the right descending bank (100-foot wide with the exception of the first and last 300 feet which is 50-foot wide) downstream of the locks and dams to improve lower approach access, construction of an access road, and construction of a temporary staging area. The staging area would be used during construction of the project and restored to pre-project conditions upon project completion.

The proposed activities would generate approximately 900,000 cubic yards of dredge material (clay, sand, and silt) that would require disposal. Four disposal alternatives are being considered, including the No-Action Alternative: (1) On-Site Disposal (Preferred Alter native); (2) Off-Site Disposal on State Owned Lands; (3) Off-Site Disposal on Private Property and (4) No-Action.

Within each of the three action alternatives, two alternate disposal plans exist, contemporary (spread out material to the extent possible without impacting wetlands or heavily wooded areas) and beneficial use for environmental enhancement/restoration. The USACE owns the entire site included in Alternative 1. However, the areas included in alternatives 2 and 3 are owned by the State of Indiana and private ownership, respectively. Therefore, prior to finalization of any plan, the property would have to be purchased or a mutual agreement needed between the USACE and the property owner. The following subsections describe each alternative dispos al site and alternative disposal design.

2.1 Alternative 1. On-Site Disposal (Preferred Alternative)

On-site disposal would be confined primarily to the southern portion of the approximately 400 -acre site adjacent to the existing J.T. Myers Locks and Dam. Within the approximate 400-acre tract, approximately 100 acres were designated as potential disposal areas. These areas were designated to avoid and/or minimize impacts to mature bottomland hardwoods, and to avoid impacts to wetlands present on-site. The habitats present within the proposed disposal areas on-site include an open prairie, ash/hackberry scrub shrub, and frequently maintained (mowed) open grassland. The prairie was established by the USACE in partnership with the Indiana Department of Natural Resources as a restoration project under Section 1135 of the Water Resources Development Act of 1986. It is made up of a mixture of native prairie grasses and range plants. It is easily recognized by the presence of little and big bluestem as well as o ther annuals and perennials.

The ash/hackberry scrub is located along the maintained clearing and prairie areas are comprised of American elm, hackberry and green ash saplings with a dense understory of leadplant, poison ivy, and various perennials and an nuals. It appears that these areas may have been cleared for agricultural use prior to Corps ownership.

2.1.1 Alternative 1A, Contemporary Design. Under this alternative disposal design, approximately 500,000 cubic yards of material would be deposited over approximately 100 acres (20.4 acres of prairie, 69 acres of frequently maintained open grassland, and approximately 11 acres of scrub shrub habitat). Upon project completion, the prairie and the frequently maintained open grassland would be restored using the original project specifications. The scrub shrub area would be re-planted using a mixture of indigenous bottomland hardwood species.

2.1.2 Alternative 1B, Beneficial Use for Environmental Restoration. Originally it was proposed that the dredge material be used to construct a series of levees throughout the site to create greentree reservoirs for waterfowl management. However, after a thorough on-site reconnaissance it was determined that a sufficient amount of natural levees and man -made roads exist on the site; and that management of the hydroperiod through a control structure in the southwest portion of the site, which is maintained by the Hovey Lake Manager, has created a setting for a majority of the site to function as a greentree reservoir in the winter. Further, it was discussed that the impacts associated with construction of levees would not justify the benefits gained through creation of a greentree reservoir in this area. Therefore, this alternative disposal design was eliminated from further consideration.

2.2 Alternative 2. Off-Site Disposal On State Owned Lands

Indiana Department of Natural Resources (IDNR) owns an approximate 143 acre tract located northeast of Hovey Lake. This area is currently under an agriculture outlease and is planted in row crops including soybeans, and corn depending on the market and on-site conditions. Portions of this area undergo periodic flooding.

2.2.1 Alternative 2A, Contemporary Design. Under this alternative disposal design, the area would receive approximately 500,000 cubic yards of material. The material would be evenly spread to raise the elevation approximately two feet and the area would continue to be farmed.

2.2.2 Alternative 2B, Beneficial Use for Environmental Restoration. Under this alternative disposal design, a series of small levees would be constructed to create cells to be managed as moist soil units for waterfowl management. The water levels would be controlled by a series of control structures, and they would be inundated to approximately 12 inches beginning in the fall and gradually released by the early spring. Specific location and design of levees, and the number of water-control structures required would be generated at a later date once contour maps of the area are developed. It is not anticipated that construction of the levees would utilize the entire amount of material generated (500,000 cubic yards), and therefore this method would include some of the contemporary design.

2.3 Alternative 3. Off-Site Disposal On Private Property

The USACE has selected an alternate disposal site for evaluation that is adjacent to the existing lock and dam site and borders State owned lands that are managed by IDNR. This approximately 467-acre tract contains a mixture of bottomland hardwoods and open agriculture fields.

2.3.1 Alternative 3A, Contemporary Design. Under the contemporary design the areas currently being farmed would receive approximately 500,000 cubic yards of material. The material would be evenly spread over approximately 263 acres (open agriculture land) to raise the elevation approximately one foot, and the area would continue to be farmed.

2.3.2 Alternative 3B, Beneficial Use for Environmental Restoration. Under this alternative, the areas currently being farmed would receive approximately 500,000 cubic yards of material. The material would be evenly spread over approximately 263 acres to raise the elevation approximately one foot and the area would be restored to bottomland hardwoods. The intent of the restoration would be to reduce forest fragmentation in the area and provide additional wildlife habitat. This would also provide a wildlife corridor to adjacent wooded tracts. Species composition and concept planting specifications proposed are the same as for Alternative 1A.

3.0 COST ANALYSIS

3.1 Introduction

The purpose of this section is to conduct and present the findings of a cost effectiveness and incremental cost analysis of the five disposal alternatives under consideration. These cost analyses are not intended to determine the best alternative, but instead, are intended to provide

decision makers with a comparison of alternatives that produce different levels of environmental outputs and assist them in choosing the alternative that best satisfies projec t objectives. The analyses are intended to improve the quality of decision making when considering alternative plans for producing environmental outputs.

Costs and quantities were developed for purposes of comparing and contrasting disposal alternative s. While analysis attempted to approximate actual costs and quantities, it is likely that final numbers will be at least slightly different. It is not anticipated, though, that differences between estimated and actual numbers will negate conclusions, her ein. However, this logic will be revisited prior to construction.

3.2 Preliminary Cost Estimates of Disposal Alternatives

To conduct cost effectiveness and incremental cost analyses, the total cost of implementing each disposal alternative must be estimated and stated on an annual basis. The preliminary cost estimates developed for each alternative were generated using information obtained from R.S. Means "Building Construction Cost Data," which was adjusted to reflect local conditions. The cost estimates include a contingency fee, an engineering, planning and design fee, and a construction management fee. The contingency fee was estimated as 12 percent of the subtotal costs (for an example of the items included in the subtotal costs see Table 3 -1). The engineering, planning and design fee was estimated as 10 percent of the subtotal costs and the contingency fee, and the construction management fee was estimated as seven percent of the subtotal costs and the contingency fee. The cost estimates exclude dredging and lock construction costs and the placing of the dredge material in an on-site stockpile; actions that will be required regardless of which disposal alternative is chosen. The cost estimates address only the disposal and subsequent site preparatio n work required for each alternative.

Table 3-1. J.T. Myers Locks and Dam, Alternative 1A, On-Site Disposal Costs

Cost Item	Quantity	Unit	Cost	Amount
Strip & stockpile 20 Ac for prairie seedbank	16,133	Cubic Yards	$0.83	$13,390
Spread fill from stockpile	500,000	Cubic Yards	$2.25	$1,125,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Tilling fill material into topsoil	100	Acres	$148.13	$14,813
Replant 11 Ac in bottomland hardwood				
65 percent hard-mast	2,159	Trees	$0.23	$486
35 percent soft-mast	1,163	Trees	$0.22	$250
Plant bare root seedlings 17"-24"	3,322	Trees	$1.75	$5,814
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Reseed 69 Ac of open grassland	69.0	Acres	$10.17	$702
Subtotal Costs				$1,878,049
Contingencies (12%)				$225,366
Engineering, Planning, and Design (10%)				$210,341
Construction management (7%)				$147,239
Total Costs				**$2,460,995**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

3.2.1. Alternative 1A. On-Site Disposal Contemporary Design. Total disposal cost of implementing Alternative 1 is estimated at $2,460,995 (Table 3 -1). These costs include stripping 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank; spreading, grading, and tilling 500,000 cubic yards of dredge material; replanting 11 acres of bottomland hardwood; spreading and grading the topsoil stockpiled at the beginning of the process, and reseeding 69 acres of open grassland. Once the dredge material is spread and grad ed, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 100 acres is estimated at three feet. The cost of replanting the bottomland hardwoods included the cost of purchasing and planting 17" to 24" bare root seedlings consisting of 65 percent hard-mast and 35 percent soft-mast, at a planting rate of 302 seedlings per acre.

3.2.2. Alternative 2A. Off-Site Disposal on State-Owned Land, Contemporary Design. Total disposal cost of implementing Alternative 2A is estimated at $9,436,001 (Table 3 -2). These costs include land easement; strippin g 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank at the on-site location; loading and hauling 500,000 cubic yards of dredge material from the dredge stockpile to the off-site location (20 miles roundtrip); spreading, grading, and tilling the dredge material; and spreading and grading the topsoil at the on-site location that was stockpiled at the beginning of the process. A daily allowance for dust control measures, associated with handling and hauling the dredge material offsite, is also included.

Table 3-2. J.T. Myers Locks and Dam, Alternative 2A, Off-Site Disposal on State-Owned Land, Contemporary Design Costs

Cost Item	Quantity	Unit	Cost	Amount
Land easement	143	Acres	$390.00	$55,770
Strip & stockpile 20 Ac for prairie seedbank (on-site)	16,133	Cubic Yards	$0.83	$13,390
Load fill material on trucks	500,000	Cubic Yards	$1.70	$850,000
Haul material off-site (20 mile roundtrip)	500,000	Cubic Yards	$10.69	$5,345,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Dust control	256	Days	$800.70	$204,979
Tilling fill material into topsoil	143	Acres	$98.75	$14,121
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Subtotal Costs				$7,200,856
Contingencies (12%)				$864,103
Engineering, Planning, and Design (10%)				$806,496
Construction management (7%)				$564,547
Total Costs				**$9,436,001**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

Once the dredge material is spread and graded at the off-site location, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 143 acres is estimated at two feet. The stripping and

stockpiling, and the spreading and grading of topsoil at the on-site location is required in order to restore the area used to stockpile the dredge material prior to hauling it off-site.

3.2.3. Alternative 2B. Off-Site Disposal on State-Owned Land, Environmental Benefit Design. Total disposal cost of implementing Alternative 2B is estimated at $11,005,205 (Table 3-3). These costs include land easement; stripping 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank at the on-site location; loading and hauling 500,000 cubic yards of dredge material from the dredge stockpile to the off-site location (20 miles roundtrip); spreading, grading, and tilling the dredge material; and spreading and grading the topsoil at the on-site location that was stockpiled at the beginning of the process. A daily allowance for dust control measures, associated with handling and hauling the dredge material offsite, is also included.

Once the dredge material is spread and graded at the off-site location, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 143 acres is estimated at two feet. After tilling, a series of small levees would be constructed to allow the creation of moist soil units for waterfowl management. The cost of compacting, watering, and grading the levees are included in the estimate. The stripping and stockpiling, and the spreading and grading of topsoil at the on-site location is required in order to restore the area used to stockpile the dredge material prior to hauling it off-site.

Table 3-3. J.T. Myers Lock and Dam, Alternative 2B, Off-Site Disposal on State-Owned Land, Environmetnal Benefit Design Costs

Cost Item	Quantity	Unit	Cost	Amount
Land easement	143	Acres	$390.00	$55,770
Strip & stockpile 20 Ac for prairie seedbank (on-site)	16,133	Cubic Yards	$0.83	$13,390
Load fill material on trucks	500,000	Cubic Yards	$1.70	$850,000
Haul material off-site (20 mile roundtrip)	500,000	Cubic Yards	$10.69	$5,345,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Dust control	256	Days	$800.70	$204,979
Tilling fill material into topsoil	143	Acres	$98.75	$14,121
Construct levees				
Compaction	250,000	Cubic Yards	$0.15	$37,500
Water truck	250,000	Cubic Yards	$1.56	$390,000
Grade and subgrade	250,000	Cubic Yards	$3.08	$770,000
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Subtotal Costs				$8,398,356
Contingencies (12%)				$1,007,803
Engineering, Planning, and Design (10%)				$940,616
Construction management (7%)				$658,431
Total Costs				**$11,005,205**

Sources. R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

3.2.4 Alternative 3A. Off-Site Disposal on Private Property, Contemporary Design. Total disposal cost of implementing Alternative 3A is estimated at $6,857,544 (Table 3-4). These costs include land acquisition; stripping 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank at the on-site location; loading and hauling 500,000 cubic

yards of dredge material from the dredge stockpile to the off-site location (five miles roundtrip); spreading, grading, and tilling the dredge material; and spreading and grading the topsoil at the on-site location that was stockpiled at the beginning of the process. A daily allowance for dust control measures, associated with handling and hauling the dredge material offsite, is also included.
Once the dredge material is spread and graded at the off-site location, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 263 acres is estimated at one foot. The stripping and stockpiling, and the spreading and grading of topsoil at the on-site location is required in order to restore the area used to stockpile the dredge material prior to hauling it off-site.

Table 3-4. J. T. Myers Lock and Dam, Alternative 3A, Off-Site Disposal on Private-Owned Land, Contemporary Design Costs

Cost Item	Quantity	Unit	Cost	Amount
Land Acquisition	467	Acres	$1,300.00	$607,100
Strip & stockpile 20 Ac for prairie seedbank (on-site)	16,133	Cubic Yards	$0.83	$13,390
Load fill material on trucks	500,000	Cubic Yards	$1.70	$850,000
Haul material off-site (5 mile roundtrip)	500,000	Cubic Yards	$5.84	$2,920,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Dust control	140	Days	$800.70	$112,098
Tilling fill material into topsoil	263	Acres	$49.38	$12,986
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Subtotal Costs				$5,233,169
Contingencies (12%)				$627,980
Engineering, Planning, and Design (10%)				$586,115
Construction management (7%)				$410,280
Total Costs				**$6,857,544**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

3.2.5 Alternative 3B. Off-Site Disposal on Private Property, Environmental Benefit Design

Total disposal cost of implementing Alternative 3B is estimated at $7,062,738 (Table 3-5). These costs include land acquisition; stripping 6" of topsoil (16,133 cubic yards) from a 20 acre plot and stockpiling for use as prairie seedbank at the on-site location; loading and hauling 500,000 cubic yards of dredge material from the dredge stockpile to the off-site location (5 miles roundtrip); spreading, grading, and tilling the dredge material; and spreading and grading the topsoil at the on-site location that was stockpiled at the beginning of the process. A daily allowance for dust control measures, associated with handling and hauling the dredge material offsite, is also included.

Once the dredge material is spread and graded at the off-site location, it will be tilled in with the topsoil to maintain site productivity. It was assumed that the soil would be worked with a subsoil cultivator or V-ripper twice for every foot-depth of disposal material placed at the site. The total depth of dredge material spread over the 263 acres is estimated at one foot. After tilling, 263 acres would be restored to bottomland hardwoods in order to reduce forest

fragmentation in the area and provide additional wildlife habitat. The cost of the restoration of the bottomland hardwoods included the cost of purchasing and planting 17" to 24" bare root seedlings consisting of 65 percent hard-mast and 35 percent soft-mast, at a planting rate of 302 seedlings per acre. The stripping and stockpiling, and the spreading and grading of topsoil at the on-site location is required in order to restore the area used to stockpile the dredge material prior to hauling it off-site.

Table 3-5. J. T. Myers Lock and Dam, Alternative 3B, Off-Site Disposal on Private-Owned Land, Environmental Benefit Design Costs

Cost Item	Quantity	Unit	Cost	Amount
Land Acquisition	467	Acres	$1,300.00	$607,100
Strip & stockpile 20 Ac for prairie seedbank (on-site)	16,133	Cubic Yards	$0.83	$13,390
Load fill material on trucks	500,000	Cubic Yards	$1.70	$850,000
Haul material off-site (5 mile roundtrip)	500,000	Cubic Yards	$5.84	$2,920,000
Grade fill	500,000	Cubic Yards	$1.32	$660,000
Dust control	140	Days	$800.70	$112,098
Tilling fill material into topsoil	263	Acres	$49.38	$12,986
Replant 263 Ac in bottomland hardwood				
65 percent hard-mast	51,627	Trees	$0.23	$11,616
35 percent soft-mast	27,799	Trees	$0.22	$5,977
Plant bare root seedlings 17"-24"	79,426	Trees	$1.75	$138,996
Spread stockpiled prairie seedbank				
Spread	16,133	Cubic Yards	$2.25	$36,299
Grade	16,133	Cubic Yards	$1.32	$21,296
Subtotal Costs				$5,389,757
Contingencies (12%)				$646,771
Engineering, Planning, and Design (10%)				$603,653
Construction management (7%)				$422,557
Total Costs				**$7,062,738**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

3.6 Average Annual Cost

Table 3-6 presents a summary of the preliminary cost estimates for the five alternatives. The average annual cost of implementing each alternative , assuming a 50-year project life and a federal discount rate of 6.875 percent, is also presented. The average annual cost is the annual amount required to amortize the present value of project costs over the life of the project. It is equivalent to the annual mortgage payment needed to finance the project over 50 years at 6.875 percent interest. Estimates of average annual income expected to be generated from agricultural leases under the contemporary designs of alternatives 2A and 3A, and the net avera ge annual costs of each alternative are included. The net average annual costs were calculated as the average annual costs of implementing the alternative minus the average annual agricultural lease income.

The average annual cost for Alternative 1, On-Site Disposal, is $175,510. No agricultural lease income will be generated under this alternative.

The average annual cost for Alternative 2A, Off-Site Disposal on State-Owned Land, Contemporary Design, is $672,945. The average annual agricultural lease income was estimated at $11,011. This income estimate was based on existing agricultural lease payments received by the state of $77 per

acre per year, applied to 143 acres. Adjusting the average annual cost to account for the agricultural lease income results in a net average annual cost of $661,934 for this alternative.

Table 3-6. J. T. Myers Lock and Dam
Alternative Disposal Costs

	Alternatives				
		Off-Site			
		State-Owned Land		Privately-Owned Land	
Cost Item	On-Site	Contemporary	Env. Benefit	Contemporary	Env. Benefit
Land acquisition/easement	$0	$55,770	$55,770	$607,100	$607,100
Strip & stockpile 20 Ac for prairie seedbank (on-site)	$13,390	$13,390	$13,390	$13,390	$13,390
Load fill material on trucks	$0	$850,000	$850,000	$850,000	$850,000
Haul material off-site	$0	$5,345,000	$5,345,000	$2,920,000	$2,920,000
Spread fill from stockpile	$1,125,000	$0	$0	$0	$0
Grade fill	$660,000	$660,000	$660,000	$660,000	$660,000
Dust control	$0	$204,979	$204,979	$112,098	$112,098
Tilling fill material into topsoil	$0	$14,121	$14,121	$12,986	$12,986
Replant bottomland hardwood					
65 percent hard-mast	$486	$0	$0	$0	$11,616
35 percent soft-mast	$250	$0	$0	$0	$5,977
Plant bare root seedlings 17"-24"	$5,814	$0	$0	$0	$138,996
Construct levees					
Compaction	$0	$0	$37,500	$0	$0
Water truck	$0	$0	$390,000	$0	$0
Grade and subgrade	$0	$0	$770,000	$0	$0
Spread stockpiled prairie seedbank (on-site)					
Spread	$36,299	$36,299	$36,299	$36,299	$36,299
Grade	$21,296	$21,296	$21,296	$21,296	$21,296
Reseed open grassland	$702	$0	$0	$0	$0
Subtotal Costs	$1,878,049	$7,200,856	$8,398,356	$5,233,169	$5,389,757
Contingencies (12%)	$225,366	$864,103	$1,007,803	$627,980	$646,771
Engineering, Planning, and Design (10%)	$210,341	$806,496	$940,616	$586,115	$603,653
Construction management (7%)	$147,239	$564,547	$658,431	$410,280	$422,557
Total Costs	**$2,460,995**	**$9,436,001**	**$11,005,205**	**$6,857,544**	**$7,062,738**
Average Annual Costs	$175,510	$672,945	$784,856	$489,058	$503,692
Annual Agricultural Lease Income	$0	$11,011	$0	$20,251	$0
Net Annual Costs	**$175,510**	**$661,934**	**$784,856**	**$468,807**	**$503,692**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

The average annual cost for Alternative 2B, Off-Site Disposal on State-Owned Land, Environmental Benefit Design, is $784,856. No agricultural lease income will be generated under this alternative.

The average annual cost for Alternative 3A, Off-Site Disposal on Private Property, Contemporary Design, is $489,058. The average annual agricultural lease income was estimated at $20,251. This income estimate was based on existing agricultural lease payments received by the state for similar property amounting to $77 per acre per year, which was applied to 263 acres. Adjusting the average annual cost to account for the agricultural lease income results in a net average annual cost of $468,807 for this alternative.

The average annual cost for Alternative 3B, Off-Site Disposal on Private Property, Environmental Benefit Design, is $503,692. No agricultural lease income will be generated under this alternative.

3.7 Environmental Benefits

Under the no-action alternative, the proposed disposal area would not be disturbed in association with the proposed action. The wooded areas would continue to mature under normal succession. When the maturation of the existing site is compared to the on-site disposal alternative, environmental beneficial design, a net increase of 5.76 average annual habitat units (AAHUs) associated with the on-site disposal alternative would occur. The contemporary designs of alternatives 2A and 3A would not produce any net increase in environmental benefits; in fact, Alternative 2A would actually result in a decrease of duck use days (DUDs) compared to existing conditions. The environmental beneficial design of Alternative 2B is estimated to produce a net increase of 132,475 DUDs per year, while the environmental benefit design of Alternative 3 B is estimated to produce 361.68 AAHUs.

3.8 Cost Effectiveness Analysis

As stated earlier, cost effectiveness analysis is intended to illustrate which alternatives can produce the same amount of environmental output for less costs or a larger quantity of output for the same or less cost. Table 3-7 presents the average annual cost and annual environmental outputs for each alternative. There is no cost associated with the no-action alternative, and the average annual net cost of the contemporary design of alternatives 2A and 3A are $661,934 and $468,807, respectively. These three alternatives do not produce any net increase in environmental benefits (the impact of the income generated by the agricultural enterprises associated with alternatives 2A and 3A are accounted for in the average annual costs). No-action is the least expensive alternative for producing no environmental output, therefore, it is the cost effective alternative for that level of output. In other words, the contemporary designs of alternative 2A and 3A are not cost effective from an environmental output standpoint. Alternative 1A, and the environmental benefit design of alternatives 2B and 3B produce different quantities of environmental output at different annual costs and therefore are considered cost effective for their respective output level and cost. The cost-effective alternatives (no-action and alternatives 1A, 2B, and 3B) are presented in bold type in Table 3-7.

3.9 Incremental Cost Analysis

Incremental cost analysis illustrates the increase in costs associated with advancing from one output level to the next higher output level. Table 3-8 presents the net average annual cost, the annual environmental output, the average cost of output, the incremental output, and the total and per unit incremental cost of the cost-effective alternatives.

The average cost per AAHUs for Alternative 1A is $30,471, which is also the incremental cost per unit. The total annual incremental cost, the increase in costs from no-action is $175,510. Alternative 3B produces 361.68 AAHUs, at an annual average cost of $503,692, resulting in an average cost of $1,393 per AAHUs. When compared to Alternative 1A, the annual incremental cost of this alternative is $328,181, and the incremental output is 355.92 AAHUs, yielding a per unit incremental cost of $922.

Table 3-7. J. T. Myers Lock and Dam, Site Specific Environmental Impact Assessment Cost Effectiveness Analysis

Alternatives	Net Annual Costs	Net Environmental Outputs
No-Action	**0**	**0**
1A, On-Site Disposal	**$175,510**	**5.76 AAHUs**
2A, Off-Site/State-Owned, Contemporary	$661,934	0
2B, Off-Site/State-Owned, Env. Benefit	**$784,856**	**132,475 DUDs**
3A, Off-Site/Private-Owned, Contemporary	$468,807	0
3B, Off-Site/Private-Owned, Env. Benefit	**$503,692**	**361.68 AAHUs**

Note: AAHUs = Average Annual Habitat Units
DUDs = Duck Use Days

Source: G.E.C., Inc.

Table 3-8. J. T. Myers Lock and Dam, Site Specific Environmental Impact Assessment, Incremental Cost Analysis Of Increasing Output from the No-Action Alternative

Alternatives	Net Annual Costs	Net Environmental Outputs	Average Cost Per Output	Incremental Outputs	Incremental Cost Total	Incremental Cost Per Unit
No-Action	0	0	Not Applicable	0	Not Applicable	Not Applicable
1A, On-Site Disposal	$175,510	5.76 AAHUs	$30,471	5.76 AAHUs	$175,510	$30,471
3B, Off-Site/Private-Owned, Env. Benefit	$503,692	361.68 AAHUs	$1,393	355.92 AAHUs	$328,181	$922
2B, Off-Site/State-Owned, Env. Benefit	$784,856	132,475 DUDs	$6	132,475 DUDs	$784,856	$6 *

Note: AAHUs = Average Annual Habitat Units
DUDs= Duck Use Days
*The output of Alternative 2B is measured in different units than alternatives 1A and 3B; therefore, the incremental costs and output for Alternative 2B are based on the increase from the no -action alternative.

Source: G.E.C., Inc.

The environmental output of Alternative 2B is measured in DUDs; therefore the incremental output and costs cannot be compared to alternatives 1A and 3B, whose environmental output is measured in AAHUs. For this reason, the incremental cost analysis for Alternative 2B is based on a comparison to no-action. When compared to no-action, the average annual and incremental cost of Alternative 2B is $779,664 and the average annual and incremental environmental output is 132,475 DUDs. This results in an average and incremental per unit cost of $6 per DUDs.

4.0 SUMMARY OF DISPOSAL ALTERNATIVES INCREMENTAL ANALYSIS

Incremental analysis demonstrates that Disposal Alternative 1A satisfies the minimum requirement of:

- No Average Annual Habitat Unit Loss with respect to the No Action Alternative, and
- Least costly disposal alternative ($175,510 net annual cost, See Table 3-7).

Implementation of one or more of the other alternatives would require justification other than for mitigation of disposal-related project impacts.

5.0 STRUCTURAL ALTERNATIVE TERRESTRIAL IMPACTS THAT WOULD REQUIRE MITIGATION.

The only long-term terrestrial impact identified that would require compensatory mitigation is the permanent loss of approximately 5 acres of riparian forest. This would result from shaving the downstream approach bank to enhance the ability of tow boats to safely approach the extended lock. Actual amount of shaving needed is uncertain at this time. Follow-on studies would determine if and how much bank shaving is required. It could literally range from none to the worst case of 2,100 feet, addressed, herein.

Given the uncertainty as to whether or not bank shaving will be required and, if so, how much, HEP analysis was not performed. However, some generalities may be expressed. The amount of riparian forest habitat lost would require replacement and replacement would necessarily be greater than one for one (acre). Many years are required for newly planted forest to mature to full habitat value (at least 30). Therefore, an equivalent replacement acreage would result in only a fraction of the AAHUs that the undisturbed site would have provided. Depending upon the target species and success of the planting, from 2 to 4 times as many acres would need to be planted to equal the AAHUs lost. So, the following assumes the worst case of replacing the 5 acres maximum loss with 20 acres (4X Replacement).

Three alternatives are compared: onsite, off-site on state-owned land and off-site on privately owned land.

6.0 COST ANALYSIS

6.1 Introduction

The purpose of this section is to conduct and present the findings of a cost effectiveness and incremental cost analysis of three riparian forest replacement alternatives under consideration. These cost analyses are not intended to determine the best alternative, but instead, are intended to provide decision makers with a comparison of alternatives that produce different levels of environmental outputs and assist them in choosing the alternative that best satisfies project objectives. The analyses are intended to improve the quality of decision making when considering alternative plans for producing environmental outputs.

Costs and quantities were developed for purposes of comparing and contrasting replacement alternatives. While analysis attempted to approximate actual costs and quantities, it is likely that final numbers will be at least slightly different. It is not anticipated that differences between estimated and actual numbers will negate conclusions, herein. However, this logic will be revisited prior to construction.

6.2 Preliminary Cost Estimates of Riparian Forest Replacement Alternatives.

To conduct cost effectiveness and incremental cost analyses, the total cost of implementing each alternative must be estimated and stated on an annual basis. The preliminary cost estimates developed for each alternative were generated using information obt ained from R.S. Means "Building Construction Cost Data," which was adjusted to reflect local conditions. The cost estimates include a contingency fee, an engineering, planning and design fee, and a construction management fee. The contingency fee was est imated as 12 percent of the subtotal costs. The engineering, planning and design fee was estimated as 10 percent of the subtotal costs and the contingency fee, and the construction management fee was estimated as seven percent of the subtotal costs and the contingency fee.

Table 6-1. J.T. Myers Locks and Dam, Riparian Forest Replacement Alternative 1, On-site, Federally Owned Land Disposal Costs

Cost Item	Quantity	Unit	Cost	Amount
Land Acquisition	0	Acres	$0.00	$0
Site Preparation	1		$3,000	$3,000
Replant 40 Acres in bottomland hardwood forest			$	$
65 percent hard-mast	7,852	Trees	$0.23	$1,806
35 percent soft-mast	4,228	Trees	$0.22	$5,977
Plant bare root seedling 17"-24"	12,080	Trees	$1.75	$21,140
Subtotal Costs				**$31,923**
Contingencies (12%)				$3,831
Engineering, Planning and Design (10%)				$
Construction Management (7%)				$3,192
Total Costs				**$38,936**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

6.2.1 Alternative 1, On-Site, Federally owned Land. Total cost of implementing Alternative 1 is estimated at $ (Table 6-1). The cost of replanting the bottomland hardwoods included the cost of purchasing and planting 17" to 24" bare root seedlings consisting of 65 percent hard-mast and 35 percent soft-mast, at a planting rate of 302 seedlings per acre. No cost is required for land acquisition. Whereas, Alternatives 2 and 3 require land acquisition.

6.2.2 Alternative 2. Off-Site, State-Owned Land. Total cost of implementing Alternative 2 is estimated at $79,881 (Table 6-2). These costs include land acquisition and cost of replanting the bottomland hardwoods including the cost of purchasing and planting 17" to 24" bare root seedlings consisting of 65 percent hard-mast and 35 percent soft-mast, at a planting rate of 302 seedlings per acre.

Table 6-2. J.T. Myers Locks and Dam, Riparian Forest Replacement Alternative 2, Off-site, State Owned Land

Cost Item	Quantity	Unit	Cost	Amount
Land Acquisition	20	Acres	$1,500.00	$30,000
Site Preparation	1		$3,000	$3,000
Replant 40 acres in bottomland hardwood				
65 percent hard-mast	7,852	Trees	$0.23	$1,806
35 percent soft-mast	4,228	Trees	$0.22	$5,977
Plant bare root seedlings 17"-24"	12,080	Trees	$1.75	$21,140
Subtotal				**$61,923**
Contingencies (12%)				$7,431
Engineering, Planning, and Design (10%)				$6,192
Construction Management (7%)				$4,335
Total Costs				**$79,881**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

6.2.3 Alternative 3. Off-Site Private Land. Total cost of implementing Alternative 3 is estimated at $79,881 (Table 6-3). These costs include land acquisition and cost of replanting the bottomland hardwoods including the cost of purchasing and planting 17" to 24" bare root seedlings consisting of 65 percent hard-mast and 35 percent soft-mast, at a planting rate of 302 seedlings per acre.

Table 6-3. J.T. Myers Locks and Dam, Riparian Forest Replacement Alternative 3,Off-site, Private Land

Cost Item	Quantity	Unit	Cost	Amount
Land Acquisition	20	Acres	$1,500.00	$30,000
Site Preparation	1		$3,000	$3,000
Replant 40 acres in bottomland hardwood				
65 percent hard-mast	7,852	Trees	$0.23	$1,806
35 percent soft-mast	4,228	Trees	$0.22	$5,977
Plant bare root seedlings 17"-24"	12,080	Trees	$1.75	$21,140
Subtotal				**$61,923**
Contingencies (12%)				$7,431
Engineering, Planning, and Design (10%)				$6,192
Construction Management (7%)				$4,335
Total Costs				**$79,881**

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

6.3 Average Annual Cost

Table 6-4 presents a summary of the preliminary cost estimates for the three alternatives. The average annual cost of implementing each alternative, assuming a 50 -year project life and a federal discount rate of 6.875 percent, is also presented. The average annual cost is the annual amount required to amortize the present value of project costs over the life of the project. It is equivalent to the annual mortgage payment needed to finance the project over 50 years at 6.875 percent interest.

The average annual cost for Alternative 1, On-Site, Federally owned Lands, is $838, or approximately one-half of the cost of Alternatives 2 and 3 ($1,598).

Table 3-6. J. T. Myers Lock and Dam, Site Specific

Cost Item	Alternatives		
	On-Site	Off-Site	
		State-Owned Land	Privately Owned Land
Land acquisition/easement	$0	$30,000	$30,000
Site preparation	$3,000	$3,000	$3,000
Replant bottomland hardwood			
65 percent hard-mast	$1,806	$1,806	$1,806
35 percent soft-mast	$5,977	$5,977	$5,977
Plant bare root seedlings 17"-24"	$21,140	$21,140	$21,140
Subtotal Costs	**$31,923**	**$61,923**	**$61,923**
Contingencies (12%)	$3,831	$7,431	$7,431
Engineering, Planning, and Design (10%)	$3,192	$6,192	$6,192
Construction Management (7%)	$2,235	$4,335	$4,335
Total Costs	**$41,181**	**$79,881**	**$79,881**
Average Annual Costs	$838	$1,598	$1,598

Sources: R.S. Means Building Construction Cost Data, 1999; G.E.C., Inc., 1999.

6.4 Environmental Benefits

Benefits are substantively the same for all three alternatives.

6.5 Cost Effectiveness Analysis

As stated earlier, cost effectiveness analysis is intended to illustrate which alternatives can produce the same amount of environmental output for less costs or a larger quantity of output for the same or less cost. In this case, the answer is simple. Alternative 1 is twice as cost effective as either alternative 2 or 3. This is because Alternative 1 does not require purchase of land.

6.6 Incremental Cost Analysis

Not Applicable.

6.7 Summary of Riparian Forest Replacement Alternatives Incremental Analysis

Analysis demonstrated that Alternative 1, was approximately one -half of the cost of Alternatives 2 and 3. Therefore, Alternative 1 is recommended.

7.0 GENERAL MITIGATION SUMMARY

Analysis of treatment of disposal areas was provided in the event that some aspects may be considered. However, all disposal area treatment is expected to be expensed as prudent engineering features.

Riparian habitat mitigation, however, is truly mitigation. Assuming mitigation is performed on-site, average annual costs are expected to be less than $1,000.

ATTACHMENT 1
PRELIMINARY DRAFT DESIGN DETAIL

Alternative 1A, Contemporary Design Detail. Under this alternative disposal design, approximately 900,000 cubic yards of material would be deposited over ap proximately 94 acres (20 acres of prairie, 63 acres of frequently maintained open grassland, and approximately 11 acres of scrub shrub habitat). Upon project completion, the prairie and the frequently maintained open grassland would be restored using the original project specifications. The scrub shrub area would be re-planted using a mixture of indigenous bottomland hardwood species.

2.1.1.1 Planting**.** The following is a general plan for restoration of filled lands back to bottomland hardwoods, as is proposed under this alternative disposal design, including proposed species composition to be planted.

- **Species**

  A mixture of at least 65 percent hard-mast and a maximum of 35 percent soft-mast producing species would be planted. Depending on availabilit y, species to be planted would typically consist of some combination of the following:

Shagbark hickory	Shumard oak
Bur oak	Swamp chestnut oak
Chinkapin oak	Green ash
Overcup oak	Common persimmon
Water hickory	Red maple

- **Site Preparation**

  Areas to be planted would be prepared by mechanical or chemical means (herbicide application), controlled burning or any combination thereof, depending on site conditions.

- **Planting Density**

  Seedlings would be planted on 12-foot centers for a total initial stand density of at least 302 trees per acre.

- **Planting Configuration**

  Species selected for planting would be planted randomly as dictated by terrain and physical characteristics of the soil to promote biodiversity.

- **Maintenance**

  Planted sites would be maintained on an as needed basis, utilizing mechanical or chemical means or a combination thereof.

- **Protection**

  Seedlings would be protected to prevent damage from herbivores when evidence warrants. Wire mesh fencing or a suitable substitute would be installed around planted seedlings at the time of planting.

- **Planting Success Criteria**

  A target minimum of 50 percent or 151 seedling per acre, must survive through the end of the second growing season following the planting. This criterion would apply to initial plantings as well as subsequent replanting, which may be needed.

- **Monitoring**

  The responsible agency (USACE or IDNR) should conduct a seedling survival survey at or near the end of the second growing season following planting of a tract. Ten percent of the planted seedlings would be tallied on tracts of three acres or less. A random survival survey accounting for at least five percent of the total number of seedlings planted in a tract would be conducted on tracts greater than three acres in size. A sufficient number of one-hundredth acre plots would be randomly established, depending on the size and configuration of the tract, but must be representative of the tract. In addition, a cursory examination of the entire planted tract should be performed to determine if overall survival is adequate.

- **Continuous Forest Monitoring**

  Continuous monitoring of the planted tracts at five-year intervals upon the attainment of the Year 2 criterion should be performed. A sufficient number of one-tenth acre permanent continuous forest monitoring plots would then be established to represent a one-percent sample of the planted tracts. Each plot center would be permanently marked; all trees within the plot would be numbered and permanently tagged. Data to be collected and recorded should include, at a minimum, the number of trees present within the plot, species composition, height, and diameter of tagged trees within each plot. The general health of the planted trees and overall stand health should also be recorded during the monitoring.

INCREMENTAL ANALYSIS – IN-RIVER MITIGATION, JOHN T MYERS AUXILIARY LOCK EXTENSION

Introduction: The Louisville District has examined the possible effects related to navigation traffic associated with the without project condition and Plans 3 and 4, the final plans considered in the planning analysis process. The tools used in this assessment were the Navigation Predictive Analysis (NAVPAT) model and the Queuing Predictive Analysis (QUEPAT) model. These models are habitat-based models that use indicator species models to reflect changes in habitat conditions that may be attributed specifically to commercial navigation traffic at planning stages of a project. Further, these models reflect specific life stages of indicator s pecies to better assess at which point in an indicator species life commercial navigation traffic may be a factor. The modeling has forecasted impacts to several species life stages for which mitigation measures can be developed. Additionally, several sp ecies life stages may be adversely impacted but specific mitigation measures cannot be developed. The species in this latter category may, however, benefit indirectly by the proposed mitigation measures and any positive considerations will be noted where appropriate in the following analysis.

An incremental analysis is a process designed to identify the mitigation alternative or alternatives that yield an optimum level of habitat units in relation to the cost to produce those units. The process compares the change in costs as average annual habitat units increase. The resulting "incremental cost" measures the cost per habitat unit gained as habitat units increase from lower output alternatives.

This analysis was based on guidance from U.S. Army Corps of Engineers Institute for Water resources (IWR Report 95-R-1). Guidelines followed are also contained in EC1105 -2-214 dated October 3, 1998 entitled "Project Modifications for Improvement and Environment and Aquatic Ecosystem Restoration".

The search for possible aquatic mitigation sites in the Myers project area included both Myers and Smithland navigation pools (Smithland pool being the pool immediately downstream of John T. Myers Locks and Dam). These two pools were identified as the best locations for mitigation measures as the projected effects from commercial navigation traffic due to Myers 600 -foot lock extension are limited to these pools. The range of possible sites where mitigation measures may be practicable or their success likely feasible are limited as basic aquatic habitat parameters must be present (depth, velocity, substrate) or no amount of "measures" can provide habitat improvements. Project sites were found in these two pools that did possess the basic habitat parameters that could then be "improved" to result in greater habitat value.

Without Project Conditions:

The Without Project conditions would be a continuation of existing habitat conditions for the foreseeable future as no changes in Ohio River pool conditions are planned. Ma in channel habitats and near shore habitats will be subject to habitat modifications related to continued man' s actions from a host of sources, many of which will come from non-commercial navigation influences.

Continued main chamber lock maintenance wi ll result in occasional periods when queues will form due to limited capacity for processing tows through the existing 600 -foot auxiliary chamber as compared to the processing capacity of the 1,200-foot main chamber.

It is expected that major in-channel habitat features, particularly islands, will continue to diminish in size in the future. Ohio River islands in the Myers and Smithland pools have been diminishing in size and this loss is expected to continue for the foreseeable future. Island size reduction and the resultant ability of the islands to provide sheltered, functional shallow water habitat will continue to diminish as island loss continues.

Habitat Models:

Habitat models were developed for NAVPAT and QUEPAT as part of an interagency Fede ral and state resource agencies and Corps of Engineers workgroup in the 1980' s. Fifteen models have been developed for the following: emerald shiner (spawning and fry), paddlefish (spawning and larval), freshwater drum (larval and adult food), sauger (spa wning and larval), channel catfish (young of year food), black crappie (spawning, fry, juvenile food, and adult food), and spotted bass (spawning and juvenile food).

Habitat Gains and Losses:

Based on the results of the NAVPAT and QUEPAT modeling, the following gains and/or losses would be expected from the Myers 600-foot lock extension over a 50-year period of time:

	smithland pool			myers pool			
	habitat units		net habitat unit change	habitat units		net habitat unit change	total net habitat unit change
	initial	ending		initial	ending		
Emerald Shiner (spawning)	8247	7590	-657	6994	6412	-582	-1239
Emerald Shiner (fry)	4908	4372	-536	4556	4031	-525	-1061
Paddlefish (spawning)	10614	9631	-983	9464	8253	-1211	-2194
Paddlefish (larval)	18406	14785	-3621	4556	4031	-525	-4146
Freshwater Drum (adult food)	9420	9304	-116	8478	8347	-131	-247
Freshwater Drum (spawning)	18489	14706	-3783	16577	13741	-2836	-6619
Sauger (spawning)	5573	5516	-57	5265	5097	-168	-225
Sauger (larval)	18337	14865	-3472	17843	14924	-2919	-6391
Channel Catfish (yoy)	1300	1300	0	2125	2125	0	0
Black Crappie (spawning)	523	523	0	700	701	1	1
Black Crappie (fry food)	763	763	0	1031	1031	0	0
Black Crappie (juvenile food)	5179	5170	-9	5229	5219	-10	-19
Black Crappie (adult food)	7112	7090	-22	7011	6984	-27	-49
Spotted Bass (spawning)	336	359	23	19	20	1	24
Spotted Bass (juvenile food)	2653	2650	-3	3669	3667	-2	-5

Mitigation will not be required for the following species life stages since the expected changes in habitat units are small: freshwater drum adult food, channel catfish young of year food, black crappie spawning, black crappie fry food, black crappie juvenile food, black crappie adult food, spotted bass spawning, and spotted bass juvenile food. Mitigation is likely not possible for freshwater drum spawning as this species life stage represents pelagic spawners which are susceptible to propeller entrainment.

Habitat losses for the remaining species life stages (emerald shiner spawning, emerald shiner fry, paddlefish spawning, paddlefish larval, sauger spawning, and sauger larval) are generally (1) shallow water for spawning and juvenile species and (2) hard structure and substrate with sufficient water flow and medium water velocity.

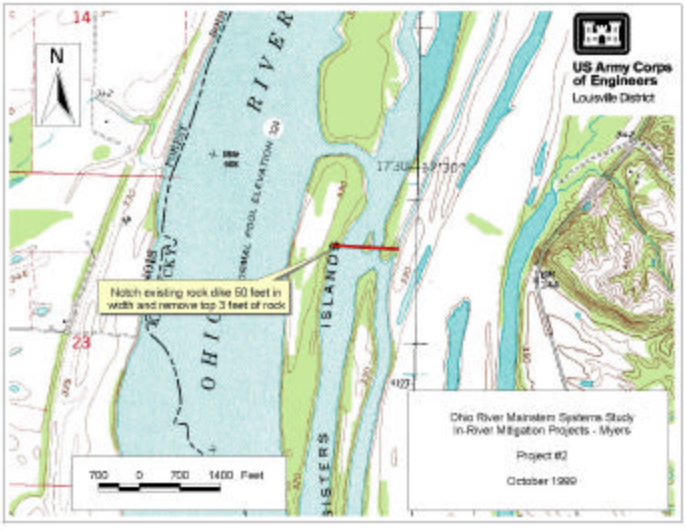
Proposed Mitigation Measures:

Project Site 1: Objective: Replace shallow water habitat for juvenile sauger and other fishes that share similar habitat requirements. Mitigation will b e to build simple rock structures in back channel and provide small additional flow by cutting a notch in the fixed weir.

Action: Notch John T Myers Dam fixed weir for a length of 200 feet to 6 inches below water line at normal pool. Sixteen rock dikes will be placed in the back channel extending from shoreline into back channel (eight from each side of the back channel). Rock dikes will be perpendicular to flow and will be placed as pairs extending from both shorelines. First rock dike pairs will ext end from both shorelines 500 feet below fixed weir and remaining rock dikes pairs will be spaced 500 feet apart downstream from the preceding pair. Rock dikes extend a length of 100 feet, will have a top elevation of 6 feet above normal pool, and will hav e a crest width of 4 feet. Each rock dike will be placed so that 25 feet of length will be landward of the normal water shoreline and the remaining 75 feet of length will be riverward of the normal water shoreline. Also, place 15 rock piles in back chann el in the middle of the channel. Rock piles will be simple mounds of rock. First rock pile will be midway between the first two pairs of rock dikes and succeeding piles will be similarly midway between following dikes. Rock piles will have a diameter of 15 feet at normal pool elevation and will have a top elevation of 6 feet above normal pool.

Completion of mitigation project #1 would add approximately 2600 habitat units for primarily sauger and paddlefish over a 50-year period. Estimated total cost is $1,827,211.

Project Site 2: Objective: Replace shallow water habitat for juvenile fish species lost from shallow water river habitat by navigation tow impacts. Mitigation will be to reopen Sisters Island back channels by breaching existing rock dikes that were constructed in early 1900's for navigation purposes and are no longer needed for that function.

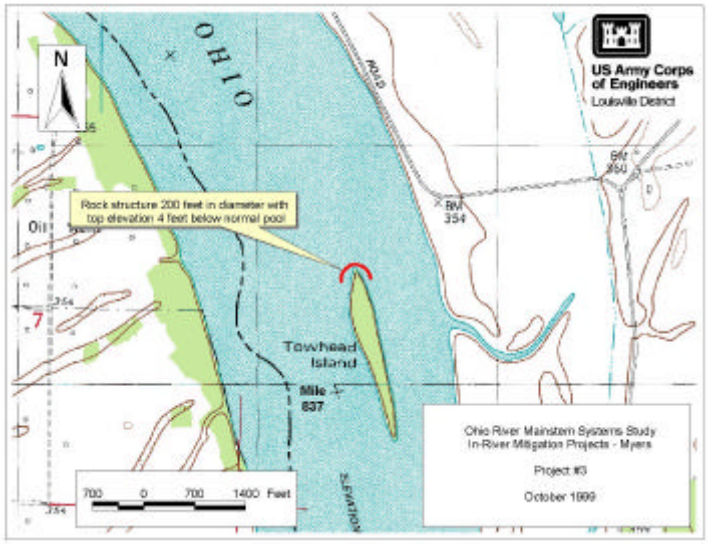


Action: Notch existing rock dike at approximately ORM 908.1 (top elevation approximately 321.0 feet). Notch should

be approximately 50 feet in wid th and remove top 3 feet of existing rock dike. Notch existing dike at ORM 908.5 (same top elevation) same dimensions. Dike at ORM 908.1 is in area that is dry during summer months and dike at ORM 908.5 is in area that is wet during summer.

Completion of mitigation project #2 would add approximately 550 habitat units over a 50 -year period for primarily emerald shiner and paddlefish. Estimated total cost is $21,154.

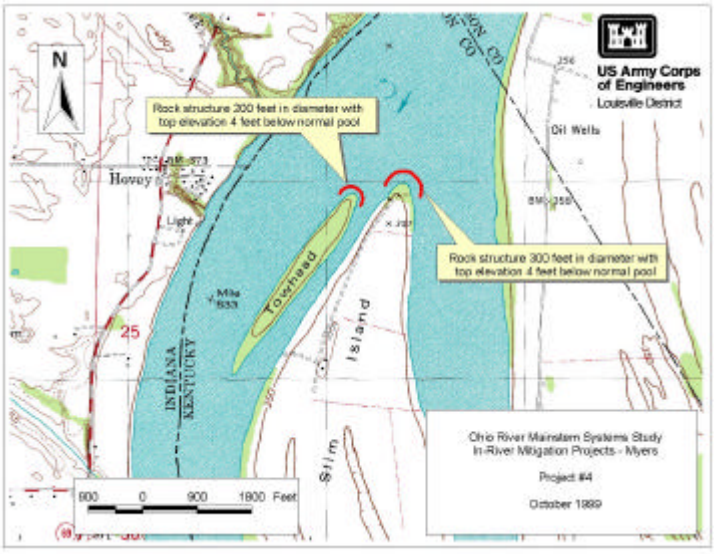
Project Site 3: Objective: Replace shallow water habitat for juvenile fish species l ost from shallow water river habitat by navigation tow impacts. Mitigation will be to provide permanent shallow water habitat in back channel of Slim Island Towhead (ORM 837) by protecting head of eroding island



Action: Place rock in shallow water on upstream head of Slim Island Towhead. Place rock as a curved dike type structure that is a half-circle in shape. Diameter of structure is 200 feet. Rock structure will have a top elevation of 4 feet below normal pool, and will have a top width of approximately 8 feet

Completion of mitigation project #3 would add approximately 1225 habitat units over a 50-year period for primarily emerald shiner, sauger, and paddlefish. Estimated total cost is $160,066.

Project Site 4: Objective: Replace shallow wate r habitat for juvenile fish species lost from shallow water river habitat by navigation tow impacts. Mitigation will be to provide permanent shallow water habitat in back channel of Slim Island and Towhead Island (ORM 832.5) by protecting heads of two eroding islands.

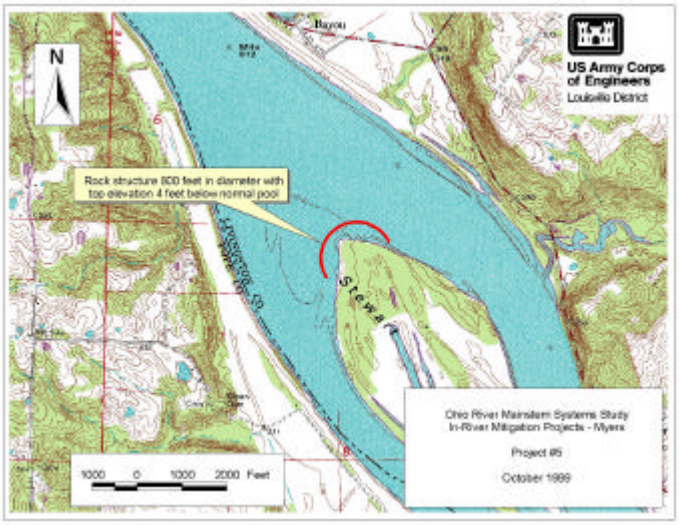


Action: Place rock in shallow water on upstream head of Slim Island and Towhead Island. Place rock as a curved dike type structure that is a half-circle in shape. Diameter of Slim Island structure is 300 feet. Rock structure will have a top elevation of 4 feet below normal pool, and will have a top width of approximately 8 feet. Diameter of Towhead Island structure

is 200 feet. Rock structure will have a top elevation of 4 feet normal pool, and will have a top width of approximately 8 feet.

Completion of mitigation project #4 would add approximately 3250 habitat units over a 50 -year period primarily for emerald shiner, sauger, and paddlefish. Estimated total cost is $339,086.

Project Site 5: Objective: Replace shallow water habitat for juvenile fish species lost from shallow water river habitat by navigation tow impacts. Mitigation will be to provide permanent shallow water habitat in back channel of Stewarts Island (ORM 912.5) by protecting the eastern side of the eroding island.

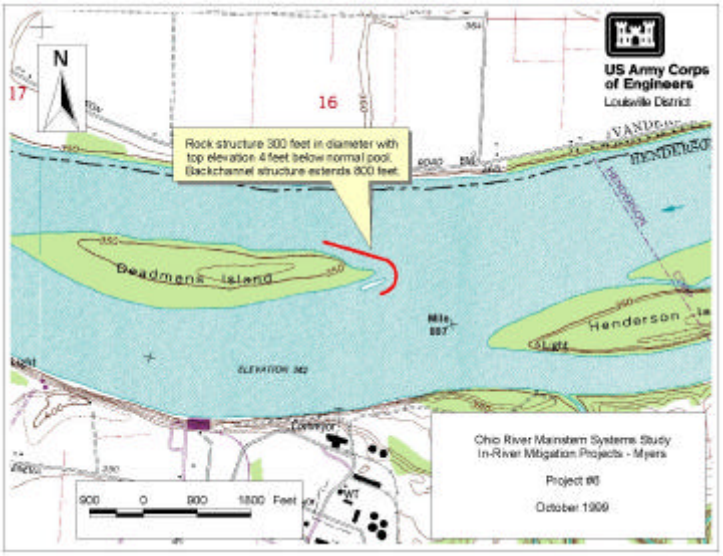


Action: Place rock in shallow water on upstream head of Stewarts Island. Place rock as a curved dike type structure that is a half-circle in shape. Diameter of structure is 800 feet. Rock structure will have a top elevation of 4 feet below normal pool, and will have a top width of approximately 8 feet.

Completion of mitigation project #5 would add approximately 2050 habitat units over a 50 -year period primarily for emerald shiner, sauger, and paddlefish. Estimated total cost is $423,540.

Based on comments received from KYFWR, protection of the eastern shore on Stewarts Island has been substituted for protection of the head of the island.

Project Site 6: Objective: Replace shallow water habitat for juvenile fish species lost from shallow water river habitat by navigation tow impacts. Mitigation will be to provide permanent shallow water habitat in back channel of Deadmans Island (ORM 808.5) by protecting head of eroding island and extending protection down back channel side of island.

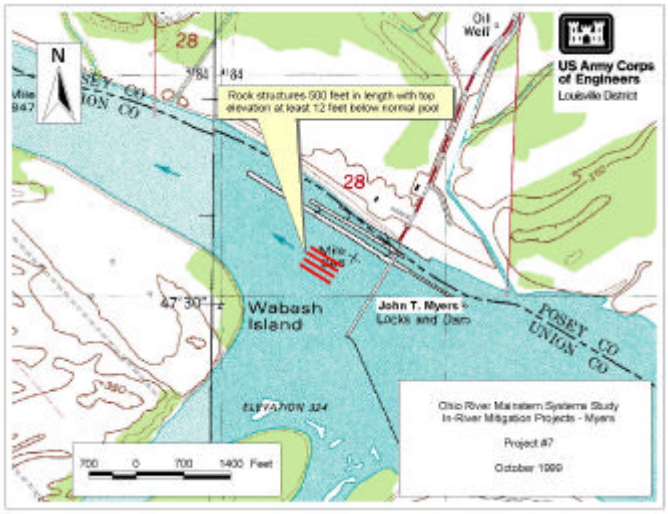


Action: Place rock in shallow water on upstream head of Deadmans Island. Place rock as a curved dike type structure that is a half-circle in shape. Extend rock dike on back channel side of island to provide additional coarse substrate habitat. Diameter of structure is 300 feet. Rock structure will have a top elevation of 4 feet below normal pool, and will have a top width of approximately 8 feet. Rock structure will be extended on back channel side an additional 800 feet.

Completion of mitigation project #6 would add approximately 1820 habitat units over a 50-year period for primarily emerald shiner, sauger, and paddlefish. Estimated total cost is $270,956.

Project Site 7: Objective: Replace hard substrate habitat for juvenile sauger and paddlefish lost in excavation of lower approach at Myers. Mitigation will be to provide permanent submerged rock dikes below tainter gates of Myers dam.

Action: Place rock in deep water on downstream side of Myers dam. Place rock as a dike type structure parallel to orientation of lock chambers. Three dikes are planned. Length of each structure is 500 feet. Rock structures will have a top elevation of approximately 6 feet above river bottom and at least 12 feet below normal pool and will have a top width of approximately 20 feet. Dike closest to lock chambers will be approximately 400 feet from riverward lockwall or between tainter gates 4 and 5. Spacing between dikes will be approximately 100 feet. Locations can also be described as below piers between gates 4 and 5, between gates 5 and 6, and between gates 6 and7. Upstream end of each dike will be 600 feet below tainter gate structure.



Completion of mitigation project #7 would add approximately 2750 habitat units over a 50 -year period primarily for sauger and paddlefish. Estimated total cost is $1,501,663.

Optimization of Individual Measures:

Project Site 1: An optimization of the number of dikes was conducted. It was determined in the project design stage that at least two pairs of dikes would be needed to achieve mitigation habitat conditions by having hard structures with running water between the structures. The optimization examined a number of pairs of dikes that should be constructed. The optimization also examined the best likely number of rock piles that should be constructed. Results of the optimization of mitigation project site #1 are shown in the following table:

Mitigation project #1 optimization

action	habitat units	total cost ($)	cost ($)/ habitat units
construct 10 dikes and 9 rock piles	1850	1,490,471	805.66
construct 14 dikes and 13 rock piles	2200	1,590,446	722.93
construct 16 dikes and 15 rock piles	2600	1,827,211	702.77

construct 20 dikes and19 rock piles	2820		2,125,829		753.84

Project Site 2: An optimization of the design of the dike breaching at Sisters Island included a single breaching of each dike individually and both breachings together. Results of the optimization of mitigation project site #2 are shown in the following table:

Mitigation project #2 optimization

action	habitat units		total cost ($)		cost ($)/ habitat units
notch 1 dike	145		14,345		98.93
notch 2 dikes	550		21,154		38.46

Project Site 3: An optimization of the design of the rock at Slim Island Towhead included a single rock dike a the head of the island and the rock dike at the island head with various lengths of dike continuing along the back channel. Results of the optimization of mitigation project site #3 are shown in the following table:

Mitigation project #3 optimization

action	habitat units		total cost ($)		cost ($)/ habitat units
construct island head only	1225		160,066		130.67
construct island head plus 200 feet	1400		204,288		145.92
construct island head plus 400 feet	1535		239,153		155.80

Project Site 4: An optimization of the design of the rock at Slim Island and Towhead Island included a single rock dike a the head of each island and rock dikes at the island head of both islands . Results of the optimization of mitigation project site #4 are shown in the following table:

Mitigation project #4 optimization

action	habitat units		total cost ($)		cost ($)/ habitat units
construct large island head	2000		331,700		165.85
construct small island head	250		56,325		225.30
construct both island heads	2250		339,086		150.70

Project Site 5: An optimization of the design of the rock at Stewarts Island included a single rock dike a the head of the island and the rock dike at the island head with various lengths of dike continuing along the back channel. Results of the optimization of mitigation project site #5 are shown in the following table:

Mitigation project #5 optimization

action	habitat units	total cost ($)	cost ($)/ habitat units
construct island head only	2050	423,540	206.60
construct island head plus 200 feet	2120	468,202	220.85
construct island head plus 400 feet	2225	494,284	222.15

Project Site 6: An optimization of the design of the rock at Deadmans Island included a single rock dike a the head of the island and the rock dike at the island head with various lengths of dike continuing along the back channel. Results of the optimization of mitigation project site #6 are shown in the following table:

Mitigation project #6 optimization

action	habitat units	total cost ($)	cost ($)/ habitat units
construct island head only	1530	237,364	155.14
construct island head plus 400 feet	1670	254,107	152.16
construct island head plus 800 feet	1820	270,956	148.88
construct island head plus 1,200 feet	1975	302,511	153.17

Project Site 7: An optimization of the number of dikes was conducted. It was determined in the project design stage that at least two dikes would be needed to achieve mitigation habitat conditions by having hard structures with running water between the structures. The optimization examined whether two, three or four dikes should be constructed. Results of the optimization of mitigation project site #7 are shown in the following table:

Mitigation project #7 optimization

action	habitat units	total cost ($)	cost ($)/ habitat units
construct two dikes	1870	1,253,592	670.37
construct three dikes	2750	1,501,663	546.06
construct four dikes	3200	1,856,416	580.13

Outputs and Costs:

Outputs for the optimized seven mitigation project sites are shown in the following table:

Optimized mitigation projects

action	habitat units	total cost ($)	cost ($)/ habitat units
project #1	2600	1,827,211	702.77
project #2	550	21,154	38.46
project #3	1225	160,066	130.67
project #4	2250	339,086	150.70
project #5	2050	423,540	206.60
project #6	1820	270,956	148.88
project #7	2750	1,501,663	546.06

Management Measures Relationships:

All seven mitigation projects can be combined for this project. In addition, construction of both projects #1 and #7 likely will have synergistic effects in the tailwaters of Myers dam.

Costs and Outputs of Combinations:

The combination of all seven mitigation project sites (at their optimized value) would result in costs and habitat units:

Optimized mitigation projects

action	habitat units	total cost ($)	cost ($)/ habitat units
all seven projects	13245	4,543,676	343.05

Inefficient and/or Ineffective Combinations:

Cost effectiveness and incremental cost analyses procedures are intended to identify the least costly plan by reducing the number of plans under evaluation. Fo r simple projects with one target species, screening out ineffective or inefficient plans is quite simple. For the John T. Myers lock extension project, each of the proposed mitigation sites have already been optimized where possible. The next step determined appropriate was to identify the plans that are the most effective in return of habitat for dollars expended, met project goals, and provided a combination of measures that limit land acquisition.

Calculate and Display Incremental Cost:

Optimized mitigation projects ranked by cost per habitat unit

action	habitat units	total cost ($)	cost ($)/ habitat units
project #2	550	21,154	38.46
project #3	1225	160,066	130.67
project #6	1820	270,956	148.88
project #4	2250	339,086	150.70
project #5	2050	423,540	206.60
project #7	2750	1,501,663	546.06
project #1	2600	1,827,211	702.77

Incremental Cost compared to No Action Plan:

All costs for each project above are additive to the "No Action" condition which is assumed to be $0.00 future costs.

Incremental Cost per Unit of Output from implementing Mitigation Measures:

The next step in the analysis was to array the measures and determine which set of measures was most cost effective. This measure was taken since these measures address needs of various and not a single target species. It was determined that an optimal mix of project measures should be identified first on an incremental cost basis. This analysis was then factored into the ultimate decision on which measures would ultimately be proposed as the overall mitigation recommendations. The array of mitigation measures based on cost effectiveness is as follows:

Optimized mitigation projects ranked by cost per habitat unit

action	habitat units	total cost ($)	cost ($)/ habitat units
project #2	550	21,154	38.46
project #2,3	1775	181,220	102.10
project #2,3,6	3595	452,176	125.78
project #2,3,6,4	5845	791,262	135.37
project #2,3,6,4,5	7895	1,214,802	153.87
project #2,3,6,4,5,7	10645	2,716,465	255.19
project #2,3,6,4,5,7,1	13245	4,543,676	343.05

Conclusions:

The loss of habitat units with the Myers 600-foot lock extension would be approximately 15, 256 units. Planned mitigation would provide approximately 13,425 units. It is expected that further project refinements during PED stage (if the lock extension is authorized) will somewhat lessen the total impacts with added design emphasis on minimizing aquat ic impacts. The results of the most cost effective combination of measures, as determined by dollars per habitat unit, are the entire array of proposed mitigation projects.

Selection of the Recommended Plan:

The recommended plan for in-river aquatic effects of Myers lock extension project are construction of all seven proposed mitigation plans.

The recommended plan was discussed, based on the incremental analysis with staff of the U.S. Fish and Wildlife Service and the fish and wildlife resources age ncies of the States of Indiana and Illinois and the Commonwealth of Kentucky.

APPENDIX H

AIR AND NOISE

Table H-1. Planned Construction Equipment				
Equipment Type	**Rating**	**Plan 3 Hours**	**Plans 1B & 2 Hours**	**Plan 4 Hours**
Chip Spreader	13w	1,077	1,077	1,846
Air Compressor	100 CFM	38	29	39
	250 CFM	15,450	15,440	15,450
	375 CFM	11,675	11,675	11,695
	450 CFM	84	53	84
	600 CFM	122	122	122
	750 CFM	94	0	4,081
	900 CFM	276	147	310
	1,200 CFM	1,560	1,560	1,560
Sandblaster	600 psi	858	590	993
Chainsaw	31"	643	643	986
Compactor	18.9"	112	112	112
	31.5"	351	351	351
Concrete Pump	65 cu yd /hr	11	80	11
	115 cu yd /hr	164	0	164
	196 cu yd /hr	15,440	15,440	15,440
Concrete Vibrator	2.5"	30,879	30,879	30,879
	3.5"	320	320	320
	6.0"	11	0	11
	High Frequency	19	19	19
Gantry w/ Boom	100 ton	630	590	630
Crane, Hydraulic	22 ton	140	140	280
	40 ton	61	20	81
	14 ton	93	93	93
	50 ton	93	93	163
	23 ton	653	653	662
LiftCrane	150 ton	877	877	877
	450 ton	386	386	386
Crane, Mechanical (ME), Crawl	75 ton	10,730	10,667	10,729
	100 ton	1,158	761	1,158
Drill, Air	2.5-4"	1,654	1,560	5,641
Drill, Core	400 ft	203	203	203
Generator	5 KWH	38	38	38
Grader		1,550	1,546	1,875
Hydraulic Hammer	1500 Ft#	1,584	1,560	1,611
Hydraulic Excavator, Crawler	2 cu yd	391	391	391
	3.125 cu yd	14,303	919	14,453
	1.5 cu yd	1,560	1,560	1,560
Landclearer, rotary cutter	20 ft cut	975	975	975
Loader, Front End, Crawler	1.5 cu yd	1,616	1,616	1,616
	2 cu yd	122	122	122
	4 cu yd	724	653	733

	7 cu yd	2	2	2
Loader/Backhoe (LD/BH), Crawler	1 cu yd	471	63	63
	4 cu yd	15	15	30
Pile Hammer	40 ton	120	38	38
	160 ton	376	121	376
	182 ton	877	877	877
Pump Water	6 gpm	203	203	203
Soil Compactor		394	394	723
Roller	15 ton	1,078	942	1,710
Dozer, Crawler w/Blade	D7	304	304	354
	D8	540	540	549
	D9	885	885	980
Dozer, Crawler, Angletilt	D5	381	381	613
Tractor		1,663	1,663	1,663
Trencher, Walk Behind		404	404	404
Truck, Dump	12 cu yd	2,833	2,833	2,880
Truck Flatbed	8x10	10	10	20
	8x12	1,666	455	1,676
	8x14	10	10	20
	8x24	25	25	50
Truck Highway	1/2 ton	260	280	560
	3/4 ton	13,144	13,154	13,696
	44300 GVW	504	504	1,008
	45000 GVW	162	162	202
	15000 GVW	1,222	11	1,252
	24000 GVW	203	203	203
	41000 GVW	943	943	1,666
	18000 GVW	241	241	241
	43000 GVW	2,686	2,686	2,708
Truck Off Highway	35 ton	52,575	6,571	53,879
Water Blaster	3000 psi	489	489	489
Welder, Portable	180 amp	1,212	1	1,212
	250 amp	885	885	885
	200 amp	1,264	1,264	1,264
	400 amp	818	310	816
Service Truck		5,855	2,335	8,103
Hydroseeder	1500 gal	236	236	236
Miscellaneous Power Tools		22,323	22,323	22,323
Small Tools		60,238	59,360	61,172
Power Mulcher		197	197	197
Cutting Torch		406	303	408
Floating Crane	100 ton	1,937	1,769	1,937
Tugboat	700 hp	1,511	1,490	1,511
Floating Crane	650 hp/35 ton	1,098	21	21
	160ton	0	1,077	1,077
	200ton	0	190	190

Tugboat	150-300 hp	1,280	1,090	1,090
Paint Sprayer		362	220	364
Drill Rig		2,088	877	2,088
Totals		**305,121**	**233,317**	**322,779**

Source: USACE, 1999

APPENDIX I

BIOLOGICAL AND SOIL DATA

Table I-1. Species of Vegetation Observed on Corps Property at Greenup Lock and Dam

Herbaceous Plants

Common Name	Scientific Name
Yarrow	*Achillea millefolium*
Wingstem	*Actinomerus alternifolia*
Redtop	*Agrostis alba*
Common Water Plantain	*Allisma subcordatum*
Wild Garlic	*Allium canadense*
Common Ragweed	*Ambrosia artemisifolia*
Giant Ragweed	*Ambrosia trifida*
Hog Peanut	*Amphicarpa bracteata*
Broom-Sedge	*Andropogon virginicus*
Indian hemp	*Apcynum cannabinum*
Burdock	*Arctium minus*
Milkweed	*Asclepias syriaca*
New England aster	*Aster novae-angliae*
Heath Aster	*Aster pilosus*
Aster	*Aster spp.*
Yellow Rocket	*Barbarea vulgaris*
Nodding Bur Marigold	*Bidens ceruna*
Tickseed Sunflower	*Bidens coronata*
Beggar' s Tick	*Bidens frondosa*
False Nettle	*Boehmeria cylindrica*
Brachyelytrum	*Brachyelytrum erectum*
Brome Grass	*Bromus tectorum*
Trumpet Vine	*Campsis radicans*
Sheperds Purse	*Capsella bursa-pastoris*
Sedge	*Carex frankii*
Bladder Sedge	*Carex intumescens*
Wild Sensitive Plant	*Cassia fasciculata*
Lamb' s Quarter	*Chenopodium album*
Chicory	*Cichorium intybus*
Thistle	*Cirsium vulgare*
Canada Thistle	*Cirsium arvense*
Virgin' s Bower	*Clematis virginiana*
Poison Hemlock	*Conium maculatum*
Field Bindweed	*Convolvulus arvensis*
Hedge Bindweed	*Convolvulus sepium*
Crown Vetch	*Coronilla varia*
Galingale	*Cyperus strigosus*
Orchardgrass	*Dactylis glomerata*
Queen Anne' s Lace	*Daucus carota*
Sticktight	*Desmodium spp.*

Smooth Crabgrass	*Digitaria ischaemum*
Buttonweed	*Diodia teres*
Barnyard Grass	*Echinocloa crusgalli*
Blunt Spikerush	*Eleocharis obtusa*
Goose Grass	*Eleusine indica*
Virginia Wild Rye	*Elymus virginicus*
Field Horsetail	*Equisetum arvense*
Daisy Fleabane	*Erigeron annuus*
Mistflower	*Eupatorium coelestinum*
Common Joe-pye Weed	*Eupatorium fistulosum*
Boneset	*Eupatorium perfoliatum*
White snakeroot	*Eupatorium rugosum*
Spotted Spurge	*Euphorbia maculata*
Meadow Fescue	*Festuca pratensis*
Green Ash	*Fraxinus pennsylvanica*
Cleavers	*Galium aparine*
Small-flowered Cranesbill	*Geranium pusillum*
White avens	*Geum canadense*
Ground Ivy	*Glechoma herderacea*
Cudweed	*Gnaphalium obtusifolium*
Woodland Sunflower	*Helianthus divaricatus*
Jerusalem artichoke	*Helianthus tuberosus*
Swamp Rose-Mallow	*Hibiscus moscheutos*
Spotted Jewelweed	*Impatiens capensis*
Small-flowered Morning Glory	*Ipomoea lacunosa*
Blue Lettuce	*Lactuca biennis*
Horseweed	*Lactuca canadensis*
Purple Deadnettle	*Lamium pupurea*
Wood Nettle	*Laportea canadensis*
Rice Cutgrass	*Leersia oryzoides*
Peppergrass	*Lepidium virginicum*
Lespedeza	*Lespedeza cuneata*
Great Blue Lobelia	*Lobelia siphilitica*
Italian ryegrass	*Lolium multiflorum*
Japanese Honeysuckle	*Lonicera japonica*
Water Horehound	*Lycopus americanus*
Black Medic	*Medicago lupilina*
Alfalfa	*Medicago sativa*
Yellow Sweetclover	*Melilotus officinalis*
Moonseed	*Menispermum canadense*
Common Monkey-flower	*Mimulus ringens*
Nimblewill	*Muhlenbergia schreberi*
Evening Primrose	*Oenothera biennis*

Star of Bethlehem	*Ornithogalum umbellatum*
Sweet Cicely	*Osmorhiza claytoni*
Redtop Panic-Grass	*Panicum agrostoides*
Deertongue Grass	*Panicum clandestinum*
Switchgrass	*Panicum virgatum*
Parsnip	*Pastinaca sativa*
Timothy	*Phleum pratense*
Pokeweed	*Phytolacca americana*
English Plantain	*Plantago lanceolata*
Common Plantain	*Plantago rugelii*
Smooth Solomons Seal	*Polygonatum biflorum*
Swamp Smartweed	*Polygonum coccineum*
Pennsylvania Smartweed	*Polygonum Pensylvanicum*
Wild Buckwheat	*Polygonum scandens*
Multiflora Rose	*Rosa multiflora*
Black Raspberry	*Rubus occidentalis*
Blackberry	*Rubus spp.*
Curly Dock	*Rumex crispus*
Duck Potato	*Sagittaria latifolia*
Common Elderberry	*Sambucus canadensis*
Soapwort	*Saponaria officinalis*
Soft-stem Bulrush	*Scirpus validus*
Mad-dog Skullcap	*Scutellaria lateriflora*
Yellow Foxtail	*Setaria glauca*
Green Foxtail	*Setaria viridis*
Horse Nettle	*Solanum carolinense*
Giant goldenrod	*Solidagogigantea*
Johnsongrass	*Sorghum halepense*
Prairie Cordgrass	*Spartina pectinata*
Common Chickweed	*Stellaria media*
Trailing Wild Bean	*Strophostyle helvola*
Dandelion	*Taraxacum officinale*
Tall Meadow Rue	*Thalictrum polyganum*
Penny Cress	*Thlaspi arvense*
Yellow Goatsbeard	*Tragopogon pratensis*
Tassel Rue	*Trauvetteria carolinensis*
Red Clover	*Trifolium pratense*
Grease Grass	*Triodia flava*
Narrow-leafed Cattail	*Typha angustifolia*
Stinging Nettle	*Urtica dioica*
Lamb' s Lettuce	*Valerianella olitoria*
Mullein	*Verbascum thapsus*
White Vervain	*Verbena urticifolia*
Wingstem	*Verbesina alterniflora*
Ironweed	*Vernonia gigantea*
Thyme-leaved speedwell	*Veronica serpyllifolia*

Bird Vetch	*Vicia cracca*
Grape	*Vitus sp.*
Woody Plants	
Boxelder	*Acer negundo*
Silver Maple	*Acer saccharinum*
Tree-of-Heaven	*Ailanthus altissima*
False Indigo	*Amorpha fruticosa*
Bitternut Hickory	*Carya cordiformis*
Shellbark Hickory	*Carya laciniosa*
Black Walnut	*Julgans nigra*
Tulip Poplar	*Liriodendron tulipifera*
White Mulberry	*Morus Alba*
American Sycamore	*Platanus occidentalis*
Cottonwood	*Populus deltoides*
Wild Black Cherry	*Prunus serotina*
Chinquapin Oak	*Quercus muehlenbergii*
Black Oak	*Quercus velutina*
Staghorn Sumac	*Rhus typhina*
Black Locust	*Robina pseudo-acacia*
Sandbar Willow	*Salix interior*
Black Willow	*Salix nigra*
Poison Ivy	*Toxicodendron radicans*
American elm	*Ulmus americana*

Source: USACE, 1998**;** B&NL, 1999

Table I-2. Birds in the Greenup Lock and Dam Area

Common Name	Scientific Name	Habitat
Redwing Blackbird	*Agelaius phoeniceus*	Open field
Mallard Duck	*Anas platyrhynchos*	Woods
Ruby-throated Hummingbird	*Archilochus colubris*	Woods/shore
Cedar Waxwing	*Bombycilla cedrorum*	Woods
Canada Goose	*Branta canadensis*	Shore/open field
Red-tailed Hawk	*Buteo jamaicensis*	Open field
Green Heron	*Butorides striatus*	Woods
Cardinal	*Cardinalis cardinalis*	Woods
Turkey Buzzard	*Cathartes aura*	Open field
Killdeer	*Charadrius vociferous*	Open field
Yellow-shafted Flicker	*Colaptes auratus*	Open field
Common Crow	*Corvus brachyrhynchos*	Shore
Blue Jay	*Cyanocitta cristata*	Woods
Pileated Woodpecker	*Dryocopus pileatus*	Woods
Catbird	*Dumatella carolinensis*	Woods
American Coot	*Fulica americana*	Shore
Common Yellowthroat	*Geothlypis trichas*	Woods
Barn Swallow	*Hirundo rustica*	Open field

Wood Thrush	*Hylocichla mustelina*	Woods
Baltimore Oriole	*Icterus galbula*	Open field
Belted Kingfisher	*Magaceryle alcyon*	Open field/ shore
Song Sparrow	*Melospiza meldia*	Open field/woods
Great Crested Flycatcher	*Myarchis crinitus*	Woods/shore
Tufted titmouse	*Parus bicolor*	Woods
Indigo Bunting	*Passerina cyanea*	Woods
Double Crested Cormorant	*Phalacrocorax auritus*	Shore
Hairy Woodpecker	*Picoides villosus*	Woods
Rufous-sided Towhee	*Pipilo erythrophthalmus*	Woods
Purple Martin	*Progne subis*	Open field
Common Grackle	*Quiscalus quiscula*	Woods
Redstart	*Setophaga ruticilla*	Woods
Eastern Bluebird	*Sialia sialia*	Open field
Meadow Lark	*Sturnelaa magna*	Open field
Starling	*Sturnus vulgaris*	Open field
Carolina Wren	*Thryothorus ludovicianus*	Woods
Brown Thrasher	*Toxostoma rufum*	Woods
American Robin	*Turdus migratorius*	Woods
Mourning Dove	*Zenaida macroura*	Open field

Source: B&NL, 1999

Table I-3. Macroinvertebrate Species in the Greenup Lock and Dam Area

Common Name	Scientific Name
Zebra Mussel	*Dreissena polymorpha*
Asian Clam	*Corbicula fluminea*
Oligochaete	*Lumbriculus variegatus*
Oligochaete	*Branchiura sowerbyi*
Mayfly	*Hexagenia sp.*
Limpet	*Ferrissia rivularis*
Amphipod	*Gammarus fasciatus*
Oligochaete	*Pristina breviseta*
Midge	*Ablabesmyia sp.*
Midge	*Tanytarsus sp.*
Midge	*Dicrotendipes sp.*
Midge	*Thienemannimyia sp.*
Midge	*Paratanytarsus sp.*
Midge	*Macropelopia sp.*
Midge	*Polypedilum sp.*
Midge	*Parachironomus sp.*
Midge	*Eukiefferiella sp.*
Midge	*Cricotopus sp.*

Source: B&NL, 1999

Species found only in the Greenup pool are indicated by (*); species found only in the Meldahl Pool are indicated by (**).

Table I-4. Fish Species of the Greenup Lock Area, Including the Greenup and Meldahl Pools

Common Name	Scientific Name
Bluegill	*Lepomis macrochirus*
Bluegill X Longear Sunfish*	*Lepomis macrochirus x megalotis*
Freshwater Drum	*Aplodinotus grunniens*
Longnose Gar	*Lepisosteus osseus*
Bowfin*	*Amia calva*
Gizzard Shad	*Dorosoma cepedianum*
Threadfin Shad	*Dorosoma petenense*
Mimic Shiner	*Notropis volucellus*
Shorthead Redhorse	*Moxostoma macrolepidotum*
Golden Redhorse	*Moxostoma erythrurum*
Silver Redhorse*	*Moxostoma anisurum*
Black Redhorse*	*Moxostoma duquesnei*
River Redhorse*	*Moxostoma carinatum*
Smallmouth Buffalo	*Ictiobus bubalus*
Black Buffalo*	*Ictiobus niger*
Bigmouth Buffalo**	*Ictiobus cyprinellus*
Channel Catfish	*Ictalurus punctatus*
Flathead Catfish	*Pylodictis olivaris*
Blue Catfish**	*Ictalurus furcatus*
Sauger	*Stizostedion canadense*
Green Sunfish	*Lepomis cyanellus*
Redear Sunfish*	*Lepomis microlophus*
Longear Sunfish	*Lepomis megalotis*
Orangespotted Sunfish*	*Lepomis humilis*
Carp	*Cyprinus carpio*
Carp X Goldfish*	*Cyprinus carpio x auratus*
Pumpkinseed	*Lepomis gibbosus*
Warmouth**	*Lepomis Gulosus*
Shortnose Gar**	*Lepisosteus platostomus*
Muskellunge**	*Esox masquinongy*
Smallmouth Bass	*Micropterus dolomieu*
Largemouth Bass	*Micropterus salmoides*
Spotted Bass	*Micropterus punctulatus*
White Bass	*Morone chrysops*
Striped Bass	*Morone saxatilis*
Rock Bass	*Ambloplites rupestris*
Yellow Bass**	*Morone mississippiensis*
Logperch	*Percina caprodes*
Banded Darter	*Etheostoma zonale*

Dusky Darter	*Percina sciera*
Channel Darter	*Percina copelandi*
Slenderhead Darter	*Percina phoxocephala*
Orangethroat Darter*	*Etheostoma spectabile*
River Darter	*Percina shumardi*
Greenside Darter*	*Etheostoma blennioides*
Johnny Darter*	*Etheostoma nigrum*
Saugeye	*Stizostedion canadense x vitreum*
Morone spp.	*Morone spp.*
Notropis spp.	*Notropis spp.*
Cyprinidae spp.	*Cyprinidae spp.*
Carpiodes spp.	*Carpiodes spp.*
Fathead Minnow	*Pimephales promelas*
Bluntnose Minnow	*Pimephales notatus*
Bullhead Minnow*	*Pimephales vigilax*
Skipjack Herring	*Alosa chrysochloris*
Mooneye	*Hiodon tergisus*
River Carpsucker	*Carpiodes carpio*
Quillback Carpsucker	*Carpiodes cyprinus*
Highfin Carpsucker	*Carpiodes velifer*
Emerald Shiner	*Notropis atherinoides*
Sand Shiner	*Notropis stramineus*
River Shiner*	*Notropis blennius*
Spottail Shiner*	*Notropis hudsonius*
Spotfin Shiner*	*Notropis spilopterus*
Steelcolor Shiner**	*Cyprinella whipplei*
Channel Shiner**	*Notropis wickliffi*
Black Crappie	*Pomoxis nigromaculatus*
White Crappie	*Pomoxis annularis*
Silver Chub	*Macrhybopsis storeriana*
Hybrid Striper	*Morone saxatilis x chrysops*
Northern Hog Sucker*	*Hypentelium nigricans*
White Sucker*	*Catostomus commersoni*
Walleye	*Stizostedion vitreum*
Spotted Sucker	*Minytrema melanops*
Carpiodes/Ictiobus	*Carpiodes/Ictiobus*
Goldfish*	*Carassius auratus*
Silver Lamprey*	*Ichthyomyzon unicuspis*
Chestnut Lamprey**	*Ichthyomyzon castaneus*
Brook Silverside*	*Labidesthes sicculus*
Paddlefish	*Polyodon spathula*
American Eel**	*Anguilla rostrata*
Central Stoneroller	*Campostoma anomalum*

Sources: ORSANCO, 1995; ORSANCO, 1997; B&NL, 1999; ODNR, 1999; ODNR, 1994

Table I-5 Greenup **Lock Extension**

	meldahl pool habitat units					**greenup pool** habitat units				
	habitat units with no traffic	Year 2010	Year 2060	habitat unit % change	net habitat unit change	habitat units with no traffic	Year 2010	Year 2060	habitat unit % change	net habitat unit change
Emerald Shiner (spawning)	9291	6728	6000	-11	-727	5222	3672	3669	0	-3
Emerald Shiner (fry)	5191	4035	3550	-12	-485	3551	3171	3082	-3	-89
Paddlefish (spawning)	10525	8446	7484	-11	-961	6224	5109	4735	-7	-374
Paddlefish (larval)	18387	12375	10265	-17	-2111	9829	7494	6903	-8	-590
Freshwater Drum (adult food)	8147	7962	7861	-1	-101	5893	5817	5779	-1	-38
Freshwater Drum (spawning)	18268	12151	9986	-18	-2165	9619	7254	6648	-8	-606
Sauger (spawning)	6468	4128	3968	-4	-160	4466	3178	3158	-1	-20
Sauger (larval)	18492	12599	10475	-17	-2123	10057	7760	7171	-8	-589
Channel Catfish (young -of-year)	999	998	998	0	0	2132	2131	2131	0	0
Black Crappie (spawning)	384	378	379	0	1	606	604	605	0	1
Black Crappie (fry food)	671	671	671	0	0	929	929	929	0	0
Black Crappie (juvenile food)	6011	5994	5966	0	-27	4796	4789	4781	0	-8
Black Crappie (adult food)	6274	6247	6218	0	-29	4039	4030	4023	0	-8
Spotted Bass (spawning)	699	201	212	5	11	856	149	170	14	21
Spotted Bass (juvenile food)	1827	1823	1821	0	-2	2791	2791	2752	-1	-39

Table I-6 John T Myers Lock Extension

	smithland pool					myers pool				
	habitat units with no traffic	Year 2010	Year 2060	% change	net habitat unit change	habitat units with no traffic	Year 2010	Year 2060	% change	net habitat unit change
Emerald Shiner (spawning)	10446	8247	7590	-8	-657	9917	6994	6412	-8	-582
Emerald Shiner (fry)	5399	4908	4372	-11	-536	5104	4556	4031	-12	-525
Paddlefish (spawning)	11813	10614	9631	-9	-983	10731	9464	8253	-13	-1211
Paddlefish (larval)	21685	18406	14785	-20	-3621	5104	4556	4031	-12	-525
Freshwater Drum (adult food)	9528	9420	9304	-1	-116	8601	8478	8347	-2	-131
Freshwater Drum (spawning)	21684	18489	14706	-20	-3783	17143	16577	13741	-17	-2836
Sauger (spawning)	8376	5573	5516	-1	-57	7960	5265	5097	-3	-168
Sauger (larval)	21723	18337	14865	-19	-3472	21239	17843	14924	-16	-2919
Channel Catfish (yoy)	1300	1300	1300	0	0	2127	2125	2125	0	0
Black Crappie (spawning)	523	523	523	0	0	708	700	701	0	1
Black Crappi e (fry food)	763	763	763	0	0	1032	1031	1031	0	0
Black Crappie (juvenile food)	5182	5179	5170	0	-9	5238	5229	5219	0	-10
Black Crappie (adult food)	7120	7112	7090	0	-22	7023	7011	6984	0	-27
Spotted Bass (spawning)	835	336	359	7	23	54	19	20	5	1
Spotted Bass (juvenile food)	2654	2653	2650	0	-3	3672	3669	3667	0	-2

SOIL DATA

ELK-HUNTINGTON-OTWELL ASSOCIATION

Hu- Huntington Silt Loam

ChA- Chavies fine sandy loam, 0 -6 percent slopes
As- Ashton silt loam
Wb- Weinbach Silt Loam
Eka- Elk silt loam, 0-2 percent slopes
OtA- Otwell silt loam, 0-2 percent slopes

Weinbach-Wheeling-Elkinsville Association

EkE- Elkinsville silt loam, 25 -40 percent slopes
To- Tioga loam, occasionally flooded
No- Nolon silt loam, occasionally flooded
SacB- Sciotoville silt loam, 1-8 percent slopes

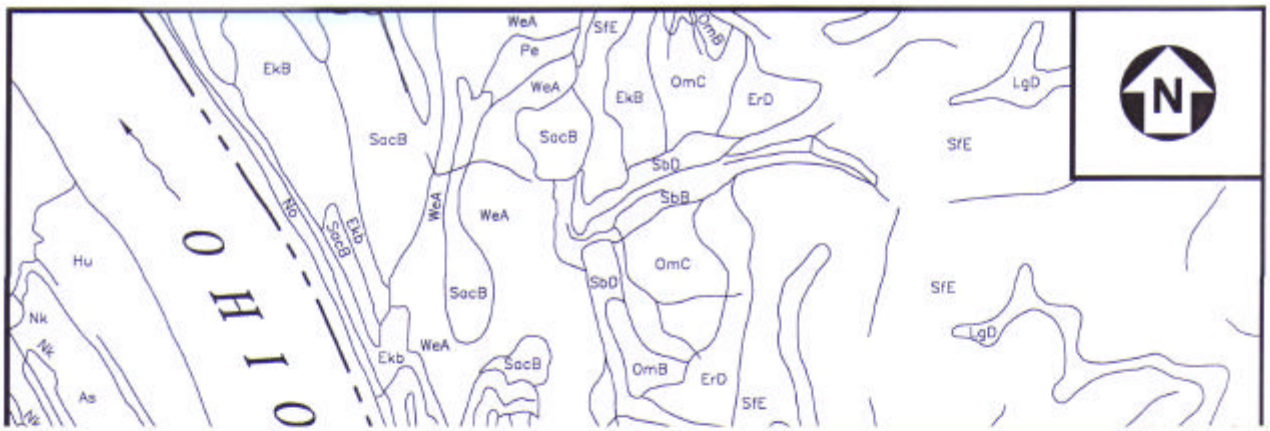

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Table I-7 Myers L&D, Upper Approach Substrates

Transect #	Sample ID	Mean Depth (ft)	Substrate Characteristics*
1	A	<1	Not Sampled. Less than 1 foot of water. Greater than 2 feet of silt.
	B	7	1 foot of silt over "mud" and sand
	C	45	1 inch of silt over hard packed sand. Downstream 1/4 transect had 2 inches silt over hard packed "mud"
2	A	5	2 - 4 inches of silt over hard packed "mud". Appears to be impacted by tow wheel wash.
	B	25	2 inches of silt over 1.5 to 2 feet "mud"/sand mix
	C	35	Areas with 1 inch of silt and areas with 1 inch of sand over hard packed "mud". Some "sand dunes" present.
3	A	25	3 inches of silt over hard packed "mud"
	B	35	Packed sand
4	A	35	2 of silt over "hard packed mud" with rip-rap scattered about
	B	41	Sand bottom with 2 inches of silt over sand in middle of transect
5	A	30	Tow wheel washed hard packed "mud"
	B	35	Upstream half is 1 inch of silt over hard packed "mud". Downstream half is hard packed sand/"mud" mix
Total			

* Substrate characteristics recorded from diver-to-surface communication and samples.

Source: ESE, 1999.

Table I-8 Myers L&D, Lower Approach Substrates

Transect #	Sample ID	Mean Depth (ft)	Substrate Characteristics*
1	A	13	2 feet of soft silt
	B	19	2 inches of silt over large gravel upstream transitioning into 2 inches of silt over sand/gravel. About halfway downstream, 2 inches of silt over mud that diver can penetrate up to 8 inches.
	C	16	Soft silty mud as far as diver can reach
2	A	<1	Not sampled. Proposed transect at waters edge
	B	13	5 inches of silt over a layer of sand that covers soft "mud" with areas of only a thin layer of silt over hardpan towards the downstream end of the transect
	C	17	Hard packed "mud"
	D	35	3 to 4 inches of silt over 8 inches of soft "mud" over sand transitioning to sand and silt over bedrock downstream
	E	36	Upstream - mixture of soft and hard "mud" with 4 inches of sand over "mud" downstream
3	A	2	6 inches to 1 foot of silt over sand
	B	22	hard "mud" at upstream end of transect changing to 1 inch of sand over "mud" to hard packed sand at end of transect
	C	26	1 inch of silt over hard packed sand. Some "river rock" under sand towards downstream end of transect
	D	26	1 inch of silt over sand/gravel mix
	E	17	"mud" upstream transitioning to sand downstream
4	A	27	Substrates transition from 2.5 feet soft mud upstream to silt over "mud" to 3 inches silt over sand/gravel to sand/gravel mix downstream
	B	28	Sand at upper 1/4 transect with thin layer of silt over sand/gravel along downstream 3/4 transect
	C	28	1 inch of silt over sand
	D	18	Sand and gravel - predominantly medium and large gravel
	E	25	2 inches of silt over gravel/cobble upstream with silt over "mud" which is over gravel
	F	27	Sand substrate with "sand dunes" channelward transitioning to gravel mix and to "mud" shoreward

5	A	26	Compact sand and gravel mix
	B	25	Primarily sand upstream with some "sand dunes" transitioning to sand gravel mix downstream
	C	25	Predominantly sand with some medium and large gravel throughout
	D	18	Some silt over gravel mix
	E	26	Compact sand and gravel mix with loose sand/gravel mix toward shore
5.5	A	25	Sand substrate with "sand dunes" channelward transitioning to gravel mix shoreward
6	A	26	Thin layer of silt over gravel mix
	B	24	Sand and gravel - predominantly medium and large gravel
	C	23	Light sand over gravel/cobble mix with "sand dunes " and some pockets of hard packed sand/gravel mix
	D	17	Shifting sand with some "sand dunes" throughout
	E	22	Gravel and "mud" toward shore with increasing gravel as move away form shore
7	A	23	2 inches of silt over sand/gravel mix
	B	23	Sand and gravel - predominantly medium and large gravel
	C	23	Sand
	D	17	2 inches of silt over hard packed sand
	E	24	Sand/gravel mix. Substrate appeared to be disturbed by tow wheel wash
7.5	B	22	Thin layer of silt over gravel mix
	C	22	Large grave/cobble channel ward transitioning to medium/large gravel with more silt on top
8	A	27	1/2 inch of silt over sand with some gravel dispersed throughout
	B	20	1/2 inch of silt over gravel and cobble mix
	C	22	Upstream 2 to 3 inches of silt over gravel mix transitioning to hard packed gravel
	D	20	Shifting sand with some "sand dunes" throughout

Source: ESE, 1999.

* Substrate characteristics recorded from diver observations and samples.

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APPENDIX J

DRAFT EXCAVATED MATERIAL SAMPLING PLAN FOR J.T. MYERS

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1.0 INTRODUCTION AND PURPOSE

The J.T. Myers lock and dam site is located on the Ohio River, 3.5 miles downstream from Uniontown, Kentucky. Large-scale navigation improvements are being considered by the Louisville and Huntington District, Corps of Engineers to accommodate increased traffic at the J.T Myers site. In order to make the improvements, excavation and placement of approximately 672,000 cubic yards (cy) of river sediments will be required.

A Phase I Environmental Assessment was performed in conjunction with the reconnaissance study for the J.T. Myer project in Late 1993 to 1994. The Phase I assessment revealed no significant contaminatio n issues other than the potential for contamination issues associated with dredging and relocation of dredged material. Testing of sediments around the existing lock and dam occur periodically in conjunction with maintenance dredging operations. This historical testing has revealed no contamination. To verify this, additional sediment sampling and chemical laboratory analysis, described herein, will be performed.

This Field Sampling Plan is an attachment to a Quality Assurance Project Plan (QAPP) dated September 1999.

2.0 PROJECT DESCRIPTION

2.1 General Project

The J.T. Myers Locks and Dam project is located on the Ohio River at mile 846.0 below Pittsburgh, Pennsylvania, 3.5 miles downstream from Uniontown, Kentucky. The upper pool extends upstream 69.9 miles to the Newburgh lock and dam site. The navigation locks are located on the right descending bank, the Indiana side of the river. At this time, the locks consist of two adjacent parallel lock chambers with an 18 -foot lift within each chamber at normal pool. The main lock chamber has clear dimensions of 110 ft. X 1200 ft., and the auxiliary lock is 110 ft. X 600 ft.

Large-scale navigation improvements are being considered by the Louisville and Huntington District, Corps of Engineers to accommodate increased traffic at the J.T Myers site. Several alternatives have been evaluated and the selected alternative provides for the extension of the existing 600-foot lock, downstream of the existing structures, to form a minimum of a 1200 -foot lock. This extension will be accomplished by demolishing an existing land wall monolith, extending the existing land wall with a 463 -foot long float in monolith, and adding a downstream float-in miter gate bay monolith. Details on the proposed project are docu mented in the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvement" dated September 1999 prepared by INCA Engineers Inc. Figure 1and Figure 2 in the QAPP depict the construction details of the selected alternative.

2.2 Excavation

The selected alternative includes the excavation of approximately 864,000 cy of material. Generally speaking, there are three different types of material to be excavated: river sediments

overbank soils and bedrock (shale and limestone). The six elements of t he project which require major excavation are:

- the wrap around culvert,
- the wall monoliths,
- the miter gate and monoliths and sill structure,
- the temporary construction moorage for float-in structures,
- the small boat basin and
- the improvement of the downstream approach

Of the six elements, the majority of the sediment excavation is associated with the construction of:

- the moorage area and
- the downstream approach channel improvements

Total sediment excavation proposed for the selected plan is a bout 670,000 cy. Figure 3 and Figure 4 in the QAPP illustrate the location of the proposed sediment excavation associated with the moorage area and the downstream approach channel improvement.

Where feasible, sediment excavation will be performed from t he shoreline using draglines or other suitable equipment. Excavation of materials in the water, outside the reach of conventional shore-based equipment, will require dredging. Most dredging can be carried out independently of other operations, in which c ase the rate of production will be relatively high. It is anticipated that hydraulic suction dredging would be more cost effective unless environmental considerations are too prohibited. Therefore, the referenced feasibility study recommended that the contractor be allowed to use the most economical method.

In the cases where dredging of overburden sediments is required in addition to drilling and blasting limestone (e.g., for the float-in land wall monolith construction), clamshell dredging is preferable. Drilling and blasting is most effectively carried out with some or all of the overburden left in place. Using this approach, much of the silt and sand will necessarily be dredged with the broken limestone, and a clamshell dredge is required. The cla mshell buckets should be without teeth and tight fitting so as to prevent loss of material.

Typical Cycle times will be 1 min. 20 sec., and each bucket should be full. There will be a 25% swell however, so net bank yards will be 4 cy. Production rate = 1,050 cy per 7 hour shift.

2.3 Placement of Excavated Material

Expansion of the 600-foot lock will require the placement of approximately 864,000 cy of excavated material on the bank of the river. Of the 864,000 cy of common excavation, approximately 672,000 cy are sediments. Excavation of 49,000 cy of rock and demolition of 6000 cy of concrete will also be required.

Approximately 46.7 acres of land is being considered for the relocation of the excavated material. The property is located just downs tream and north of the existing lock and service

mound (see Figure 3 in the QAPP). The By filling to a final grade of El. 367, approximately 895,000 cy of excavated material will be placed on site (see cross section on Figure 5 in the QAPP). Also considered is stretching the proposed area to 94 acres (as shown on Figure 6 in the QAPP). Therefore, in order to reduce the top of the spoil mound elevation, the area will be expanded. It will fit within the 94 acres that have been identified, and the top of mo und elevation will be reduced from what is currently shown. The top of mound elevation shall be held at or blow El. 358, which is below the existing road at the site.

All excavated material except suitable backfill, rock and demolition debris will be spo iled in this area. Some of the material removed for installation of the wrap around culvert or lower approach channel improvements will need to be temporarily stockpiled before backfilling the culvert and other structures. Some of the stockpiled material may be used to construct temporary dewatering berms and elevated construction staging and lay down areas. See Figure 7 and
Figure 8 in the QAPP for some temporary construction requirements.

3.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

Sample co llection and reporting will be performed in -house by the Environmental Engineering Branch of the Louisville District US Army Corps of Engineers (USACE). Drilling services will be performed by a Louisville District USACE contractor who has not yet been de termined. Quanterra will perform the chemical laboratory analysis.

Technical Team Members

IDEM Team Member:	Andrew Pelloso, IDEM
Project Manager:	Veronica Rife, CELRL -DL-M
Industrial Hygienist:	Shelton Poole, CELRL -ED-EB
Project Scientist:	Chris Karem, CELRL -ED-EE
Safety QC:	Shirley Dunn, CELRL -SO
Risk Assessor:	Dr. David Brancato, CELRL -ED-ED
QA Chemist:	Dr. Samir Mansy, CELRL -ED-EB
Independent Technical Review:	Gary Meden, CELRL -ED-EB

4.0 SCOPE AND OBJECTIVES

The purpose of t his project is to evaluate potential contaminants in the river sediments to be excavated and relocated during the J.T. Myers lock improvements project. Field sampling and chemical laboratory analysis will be performed to evaluate the sediments. Results o f the laboratory analysis will be compared to risk -based, media - specific screening criteria. IDEM' s Tier II clean-up goals will be used as the screening criteria.

The field evaluation for this project will include obtaining representative sediments samples from the J.T. Myers lock and dam site. Target parameters include Target Analyte List (TAL) metals, Semi-Volatile Organic Compounds (SVOCs), pesticides and Polychlorinated biphenyls (PCBs). Chemical laboratory analysis will be performed using USEPA SW-846 methodology.

Additional data will be gathered to help assess the physical characteristics of the sediments. This includes pH, total organic carbon (TOC), and soil grain size distribution and/or soil plasticity.

5.0 SAMPLING DESIGN AND RATIONALE

Formal Data Quality Objectives (DQOs) for this project were evaluated and documented in an associated document dated September 1999. The DQOs are attached to the previously referenced QAPP for this project.

A total of 5 borings will be advanced in the moorage area and the downstream approach. Proposed boring locations in the mooring area and downstream approach area are shown on the attached figures (Figure FSP-1 and Figure FSP-2). Sampling at each boring will consist of one representative, composite sample from each distinct layer of sediments. The maximum thickness represented by any one composite sample will not exceed 4 feet.

Review of 1995 borings drilled downstream of the existing lock area indicated there are 2 distinct sediment layers above limestone bedrock. The upper layer consisting of silty clay sediments from 5.5 feet to 6.0 feet thick and a second layer of sand and gravel about 4 feet thick. Review of boring records from the mid-1960s indicated the sediments primarily consisted of sands and gravel ranging from 5 to 12 feet thick. Very little fine-grained sediments were indicated on the mid-1960 boring logs. Based on these records it is likely to encounter an upper layer of fine-grained sediments underlain by sands and gravel. It is also possible that very little fine-grained sediments will be available and the sediments will consist only of sand and gravel.

6.0 FIELD ACTIVITIES AND SAMPLING PROCEDURES

6.1 Sample Documentation

A logbook will be kept on the barge during all field activities. The logbook will be updated continuously and will constitute the master field evaluation documents. Information to be recorded in the logs include, but is not limited to the following:

- Project Identification
- General work activity, work dates, and general time of occurrence
- Unusual events

- Weather conditions (ambient air temperature, sky conditions, precipitation and personal observations of wind conditions)
- Unusual river conditions (i.e. notable variations from normal pool, increased turbidity)
- Visitors
- Sample number and time of day for each sample collected for analysis
- Sample description including Unified Soil Classification System (USCS) field classification
- Variances from project plans and procedures
- Accomplishment of morning safety meetings

6.2 Sediment Sampling Procedures

Borings will be advanced with a barge -mounted drill rig using continuous flights of 3 ¼-inch inner diameter hollow -stem augers. Soil samples will be collected during borehole advancement using a split -spoon sampler for Standard Penetration Test Methods in accordance with ASTM Designation D 1586. The drill rig and augers will be steam -cleaned (or scrubbed with Alconox soap and distilled water) prior to initiation of drilling. Sampling equipment will be scrubbed with Alco nox soap and rinsed before each individual sampling episode to limit the potential for downhole and crosshole contamination (see section 6.4, Decontamination). The following sampling protocol will be utilized:

- Decontaminate the sampling equipment ;
- Record the boring location on a site map and in the field notebook;
- Attach a decontaminated split spoon sampler to the drill rods;
- Push or drive the sampler (hydraulic ram or percussion hammer) to the desired depth;
- Retrieve the sampler and o pen the split -spoon sampler;
- Repeat the last 3 steps for additional sampler(s) if the stratum appears to continue below the extent of the driven spoon;
- Don a clean pair of latex surgical gloves;
- Place all the material of the same stratum (i.e. silty cla y) into a stainless steel bowl and homogenize;
- Fill the sample containers
- Record applicable information on the chain of custody (CoC) record.

- Complete the lithologic description of the recovered sample according to the USCS

The field team will main tain and update boring records to illustrate soil descriptions, sample locations, sample depth, standard penetration N values, and water depth. All samples collected will be preserved according to U.S. EPA protocols established for the target parameters o f interest (see Section 7.1). The field team will take appropriate measures to ensure that storage requirements with respect to sample temperature are maintained during transportation to the laboratory and prior to log -in and storage at the laboratory.

All sediment samples will be sent, under chain of custody protocol, to an off -site laboratory for chemical analysis. Chemical analysis of each laboratory sample will include TAL metals, SVOCs, pesticides, and PCBs. Testing for pH and TOC will also be perf ormed for every change of soil strata. Selection of geotechnical samples will be determined in the field in order to validate field USCS classification.

6.3 Field Quality Control Sampling

The following field quality control samples will be collected to monitor sampling precision and temperature control during shipping:

- Duplicates – Duplicate samples will be collected at the same time as the original samples and in the same analytical sequence. One field duplicate will be collected for every 10 primary samples, with a minimum of one duplicate sample. These " blind" duplicate samples will be used to monitor sampling precision in the field. There will be no indication to laboratory personnel that they are field duplicates nor will laboratory personnel be able to determine which environmental samples they duplicate. Duplicate analysis will be performed for TAL metals, SVOCs, pesticides, and PCBs. Duplicates will be identified within the alphanumeric sample code by creating a fictional sampling location. It is imperative that the duplicate sample identification number and which environmental sample it duplicates be recorded in the field log book, sample collection sheet, or boring log for future data assessment.

- Temperature Blanks – These samples will be prepared by submitting a bottle pre -filled by the analytical laboratory. Coordination will be accomplished with the receiving laboratory to ensure that adequate temperature blanks will be provided to the field samplers. This sample will be clearly ide ntified as a temperature blank. This sample will be added in every cooler prepared for shipment to the analytical laboratory to monitor temperature of the samples while in transit from the field to the laboratory.

6.4 Decontamination

Decontamination pr ocedures are implemented to prevent cross -contamination, to control potential migration of chemical constituents, and to prevent worker exposure to chemicals or pathogens that may contaminate clothing or protective gear. A decontamination system shall be e stablished to wash and rinse all personal protective and sampling equipment. Several gallons of clean, distilled water will be maintained on site along with plastic buckets, brushes, soap, etc., for decontamination during the sample collection process.

Personal safety and health considerations will be presented in a Site -Specific Health and Safety Plan (SSHSP) that will be prepared and approved by USACE safety personnel prior to the initiation of field activities. In addition, all hand tools and equipmen t will require decontamination prior to removal from the work area. Disposable personal protective equipment (PPE), decontamination liquids and excess sediment samples will be handled in accordance with see Section 8.0 of this document.

Only minor decont amination of site personnel is anticipated, incorporating gross decontamination of the soles of work boots and any personal protective equipment used while on site. All discarded material shall be handled in such a manner as to preclude spreading of contam ination, creating a sanitary hazard, or littering the area. In addition, site workers must wash their hands (and face optional, if exposure warrants) with soap and water before eating or drinking and before leaving the sampling area.

Decontamination proce dures involved in this scope of work will generally involve the subsequent cleaning of any sampling equipment associated with sediment collection. Generally accepted measures for ensure data quality and reliability will be employed. Sampling tools and equi pment will be scrubbed with distilled water and soap (Alconox or other non -phosphate detergent), with a final rinse of distilled water.

This will be accomplished by moving the equipment to a " contained area" and washing down all suspected equipment with brush scrubbing and the soap solution. Hand tools, trowels, scoops, bowls, bailers, etc., used for sample collection of soils shall similarly be decontaminated between samples and before leaving the site for the day.

Decontamination of the augers will fi rst require personnel to dress in suitable safety equipment to reduce personal exposure as required by the SSHSP. The augers will require decontamination on various levels. The first level of decontamination is removal of drill cuttings and/or caked -on sediments. These will be scraped off with a flat-bladed scraper at the sampling site. The second level of decontamination is steam-cleaning the augers or washing them with distilled water and soap (Alconox or other non -phosphate detergent), with a final r inse of distilled water.

Materials used for decontamination will be compatible and safe for the purpose intended and for site workers. Consistent with the Hazardous Communication Standard, 29 CFR 1910.1200, any chemical materials brought on -site will be accompanied by a Materials Safety Data Sheet (MSDS) and kept with the field team. We do not anticipate having chemicals on site.

7.0 FIELD SAMPLE IDENTIFICATION AND CUSTODY PROCEDURES

Proper sample collection and analysis requires the maintenance of ch ain-of-custody (CoC) procedures. CoC procedures include tracking and documentation during sample collection, shipment, and laboratory processing. A sample is considered to be in an individual' s custody if it is:

In the physical possession or view of the responsible party

Secured to prevent tampering

Placed in a restricted area by the responsible party.

The sampling team leader is responsible for the custody of the collected samples in the field until they are properly packaged, documented, and release d to the courier for shipment to the laboratory. The laboratory is responsible for sample custody thereafter. Custody will be documented by using the CoC record initiated for each day that samples are collected. This record will accompany the samples fr om the site to the laboratory and will be returned to key project personnel with the final analytical report. All personnel with sample custody responsibilities are required to sign, date, and note the time on the CoC record when relinquishing and receivi ng samples from their immediate custody. Any discrepancies will be noted at this time. All samples will be shipped via overnight courier to the analytical laboratory. Sample documentation and custody for field and laboratory activities are detailed in t he following sections.

7.1 Sample Containers, Preservation, and Holding Times

Quanterra laboratory will supply sample containers, blank labels, preservatives, and packing materials. Containers will be selected to ensure compatibility with the sample matrix and chemical constituents to be analyzed and to minimize breakage during transportation. Required sample bottle sizes and preservatives, and maximum holding times are listed in the table below. Sample labels will be affixed to containers and filled out at the time of sampling. The following information will be recorded on each label:

- Sample identification number
- Project number
- Collector' s initials
- Date and time of collection
- Preservatives added
- Sample type
- Sample Depth

Summary Table of Sample Containers, Preservation Methods, and Holding Times for Sediment Samples

Parameter	Analytical Method	Quantity	Container	Preservation Method	Holding Time
SVOCs	8270C	8-12	4-ounce, wide-mouth, amber glass, Teflon-lined cap	Cool, 4°C	Extraction: 14 days Analysis: 40 days
TAL Metals	6000/7000 series	8-12	4-ounce, wide-mouth, amber glass, Teflon-lined cap	None	6 months Hg: 28 days
Pesticides	8081	8-12	4-ounce, wide-mouth, amber glass, Teflon-lined cap	Cool, 4°C	Extraction: 14 days Analysis: 40 days
PCBs	8082	8-12	4-ounce, wide-mouth, amber glass, Teflon-lined cap	Cool, 4°C	Extraction: 14 days Analysis: 40 days
pH	9045C	5-10		None	Analysis: 1day
TOC	9060	5-10	4-ounce, wide-mouth, amber glass, Teflon®-lined cap	Cool, 4°C	28 Days

7.2 Sample Identification

Each sample will be assigned a unique identification number that uniquely identifies each sample for analysis.

7.3 Sample Packaging

The following procedures will be performed during sample packaging:

- Number of samples will be verified with field logbook documentation,
- Sample labels will be checked for accuracy and legibility,
- All samples will be wrapped in bubble pack material and placed in sealed, zip-locked bags,
- All coolers will have a temperature blank so that the temperature can be monitored,

- Samples will be packaged in a thermally -insulated, rigid cooler,
- Packing materials will be placed in the cooler to prevent breakage,
- Ice will be placed in the cooler for samples requiring 4 °C ± 2° preservation,
- Each cooler will have its own signed and dated CoC form reflecting the samples inside,
- The CoC form will be placed in a sealed, zip -locked bag and taped inside the lid of the cooler,
- The cooler will be closed and sealed with duct tape around the both ends and around the lid,
- Custody seals will be placed in two separate locations on the cooler across the lid and the main body of the cooler and signed by the field team leader,
- An addressed courier bill will be placed on the cooler so that it can be shipped.

7.6 Custody Transfer and Shipment Procedures

A CoC form will accompany all samples. When the possession of samples is transferred, the individual relinquishing the samples and the individual receiving the samples will sign, date, and note the time of transfer on the CoC document. This record will represent the official documentation for all transfers of sample custody until samples arrive at Quanterra Laboratories, North Canton, Ohio. Samples will be shipped for overnight service by the courier. This will allow for the least amount of time from sampling to analysis, and will ensure that all holding times are met. The field team leader will perform notification of sample shipment to the laboratory.

Quanterra Laboratory
4101 Shuffel Drive NW
North Canton, OH 44720

Phone (330) 497-9396
Fax (330) 497-0772

8.0 DISPOSITION OF FIELD INVESTIGATION DERIVED WASTE (IDW)

Investigation-derived waste (IDW) will be minimal for this field activity. All personal protective equipment (PPE) (e.g. Tyvek ®, nitrile or latex gloves) will be placed in a plastic garbage bag and taken to a dumpster for disposal. All decontamination liquids and excess sediment will be placed back into the river. Stored IDW will be identified and properly handled while it is being accumulated or stored on site.

APPENDIX K

COMMENTS & RESPONSES ON THE DRAFT EIS

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Comment Response Summary

The following table provides a list of comments received on the DEIS for the Ohio River Lock Improvements. These comments ar e organized by the agency/organization who submitted a letter, which can be found in the pages following this comment response summary. A brief subject description of the comment, how the comment was addressed and where the comments were incorporated in the FEIS are also listed in the table.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of Interior; General Comments	Concern was raised that an adequate description of the baseline conditions for fish and w ildlife resources was not provided.	*Location:* *Section 4.0* Please see Section 4.0

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior; pg. ii	Concern was raised that the No Action Alternative should be expanded to indicate how the "No Action" alternative would adversely impact the listed parameters.	*Location:* *Executive Summary* The No Action Alternative would have adverse impacts on soils, water quality, air quality, biological resources, aesthetics, noise levels, human health and safety, and socioeconomics. This alternative would result in an increased number of toe -ins, thus changing the soil characteristics of the area. Towboats in queue would also allow for the suspension of sediments, thus negatively impacting water quality. Additionally, increased congestion and queuing would lead to increased emissions, degrading air quality; decreased aesthetic value of the area from loss of shoreline vegetation; increased noise levels from increased traffic during maintenance outages; increased risks to human health and safety to crew members and recreational users; and increase operational costs. Biological resources may be harmed by direct impact of queuing tows. Increased harm to the aquatic biota and riparian vegetation would be expected during future maintenance outages. These biological impacts could be significant depending upon the length and duration of closure induced queues. The proposed project at Myers would minimally affect aesthetics, noise, human health and safety, transportation, cultural resources and waste management. To a greater degree, soils, water quality, air quality, biological resources and recreation would be adversely affected. Operation of the extended auxiliary lock would continue to adversely affect recreation, although, air quality and noise would be beneficially impacted. Mitigation activities would positively affect biological resources to a large degree. The No Action Alternative would ca use adverse impacts to water quality, air quality, biological resources, aesthetics, noise, human health and safety, and socioeconomics. Water Quality would be degraded from the suspension of sediments from towboats in queue. Toe-ins would also increase air emissions and degrade air quality; increase turbidity and suspended solids and harm benthic species; decrease the aesthetic value of the areas from loss of vegetation along the shoreline; increase noise levels along the river; increase risks to the health and safety of crew members and recreational users; and increase operational costs.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior, pg. 33	Comment regarding bank protection.	*Location:* *Section 2.1.3.4.1* Potential areas of concern include the harbor and near the area of the extended upper approach wall. The need for bank protection would ultimately depend upon anticipated approach angles and subsequent conditions. Disturbed banks would be restored using bioengineered and/or other appropriate bank stabilization techniques similar to those described in Appendix F. The exact practices would not be determined until more detailed design has been completed. However, habitat values per acre prescribed in Appendix F are feasible and would be preserved in the final design. Should additional bank clearing and restoration be required, base upon model results, bank stabilization practices would attain habitat values per acre described in Appendix F for impacted areas.
Department of the Interior, General Comments.	Concern was raised about lock construction obstructing fish passage.	*Location:* *Section 8.4* The Corps will conduct fish passage studies and will work with the Service and the States to modify designs and/or operations to enhance desirable fish movements if obstructions are determined from the study.
Department of the Interior, pg. 76	Concern was raised regarding the quality of topsoil for reestablishment of vegetation.	*Location: Section 2.2.3.5.1* The scrub shrub area would be re-planted using a mixture of indigenous bottomland hardwood species and any other more appropriate riparian species. Several steps would be taken to minimize the impact to the area soils capability to support revegetation. Approximately one-half of the disposed material would be tilled into the exposed soil strata; then the remainder spread on top. Compaction would be kept to the minimum that is required to shape the site and to control erosion by use of low ground pressure equipment. Topsoil will be established using appropriate means prior to replanting. In this way, the resultant soil conditions would have an optimal chance of supporting new vegetation. Site monitoring and fertilization, as needed , would be employed to insure success. *Location: Section 8.3* The preferred Disposal Alternative 1A would be revegetated with appropriate riparian species, possibly bottomland hardwoods. Organic material would be added to the surface layer of the restored site to ensure quality of the topsoil.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior, pg. 76	Comment regarding Disposal Area 2A consisting of farmed wetlands.	*Location: Section 2.2.3.5.1* Based on further evaluation, since the Draft EIS has been circulated and comments considered, the Corps recommends that Disposal Alternative 1A be the preferred alternative. Further evaluation of the disposal sites are confined to this alternative in the FEIS.
Department of the Interior, pg. 82	Comment regarding Disposal Alternative 3B and habitat diversity.	*Location: Section 2.2.3.5.1* See response to Department of the Interior pg. 76 above.
Department of the Interior, pg. 84	Concern regarding habitat loss under Disposal Alternative 2A.	*Location: Section 2.2.3.5.1* See response to Department of the Interior pg. 76 above.
Department of the Interior, pg. 103	Concern was raised with the definition of mussel beds and correction of purple catspaw pearly mussel.	*Location: Section 3.2.1* No community or groups of native mussels were found within 1 mile downstream of the dam. Seven native mussel individuals were found in the 0.5 mile zone upstream of the dam during surveys in August of 1999 (See Appendi x B). *Location: Table 3-18 Section 3.2.5.1.3* Correct information was added to Table 3.18 on the purple catspaw pearly mussel.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior, pg. 116	Concern was raised to state whether the negative impact from queuing is significant, and why.	*Location: Section 3.2.3.2.2* The No Action Alternative would result in continued or increased tow congestion and queuing during maintenance operations. The size and extent of this queue depends largely on towing industry response to future maintenance closures. Current industry behavior suggests that near-term queues can be expected to develop in the vicinity of the lock and dam. Long - duration maintenance closures would not be expected to produce queues above 100 tows for the near-term. Projections of future queues are based on demand and equipment projections. These data suggest that future maintenance outages may produce queues several hundred tows in length during closures circa 2050. Current data provides little insight into where these tows would queue during such an outage. Nevertheless, any extended periods of queuing would lead to increased turbidity and thus affect water quality form sedime nt disturbance in the area hosting the queue. The size of the potential queue suggests that the impact of queuing would be significant during maintenance outages late in the study period.
Department of the Interior, pg. 116	Concern was raised regarding impact to water quality from towboats in queue.	*Location: Section 3.2.3.2.2* Table 3-12 was changed to reflect significant impacts to water quality.
Department of the Interior, pg. 123	Comment regarding mile markers along the Ohio River.	*Location: Section 2.2.1* Section 2.2.1 provides a description of mile markers and counties.
Department of the Interior, pg. 129	Comment regarding consistency throughout the document.	*Location: Section 3.2.5.2* For consistency throughout the document, the list of potential impacts at the beginning of each "Environmental Consequences" section contains possible impacts of both the action and no action alternatives. Table 3-20 provides additional clarification.
Department of the Interior, pg. 130	Concern was raised that the types of measures that would be used to "discourage migratory birds from nesting" should be discussed.	*Location: Section 8.1* However, if such scheduling is not possible or if unforeseen construction delays occur, the Corps will work with the USDA Animal Damage Control to develop site -specific strategy to discourage migratory nesting.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior, pg. 130	Comment regarding turbidity monitoring during construction and the possibility of winter construction.	*Location: Section 8.4* A turbidity curtain would be used to minimize turbidity outside of the construction area and provide a means to conduct in-river construction throughout the year. Limiting in-river construction activity to the winter months would increase local aquatic and terrestrial impacts and increase the cost of the project. The curtain would be an underwater type silt fence that is currently being used on other Corps lock projects. Much of the excavation for the lock extensions would occur in the "slack-water" behind the existing riverwall upstream and downstream of the Greenup dam. A silt curtain would retain most of the sediments suspended by in-river work in this low-velocity environment. The Corps would monitor the functioning of the curtain to ensure protection of downstream resources. Much of the Greenup lock enhancement project requires work in the waters of the Ohio River adjacent to the current Greenup structure. Use of a silt curtain would minimize downstream impacts from suspended sediment during construction of the lock extension. This technique provides for a relatively brief construction period by allowing flexible and environmentally sound construction sequencing for in-river work. Limiting in-river work to winter months would quadruple the construction period for the project, delay recovery of local aquatic and terrestrial resources, and post-pone implementation of on-site mitigation. Seasonal restrictions on in-river construction would result in delays for temperature and water level controls and a reduction in the number of working construction days within the winter season. Substantial cost increases would occur from the extra mobilization/demobiliz ation of large equipment and prolonged leases and contracts.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior, pg. 132 and 216	Comment regarding NAVPAT.	*Location: Section 3.2.5.2.1* This analysis was used as a tool to help develop proactive mitigation measures for the construction activities. *Location: Table 3-20, Section 3.2.5.3 and 3.2.5.2.1, Table 3-45 , 3.3.5.3 and 3.3.5.2.1* Traffic conditions between the With and Without Pr oject condition would cause a decrease in habitat values for paddlefish, sauger, freshwater drum and emerald shiner. Because these impacts are localized and extremely rare, the impacts would be adverse, but mitigated. (See Appendix G).
Department of the Interior, pg. 133	Comment regarding Table 3-20 and turbidity contaminants.	*Location: Table 3-20, Section 3.2.5.3* Table 3-20 was corrected to read "adverse, but not significant"
Department of the Interior, pg. 186/187	Comment regarding discrepancy of elevation.	*Location: Section 2.2.3.5.1* The disposal material would raise elevations 7 ft.
Department of the Interior, pg. 188	Comment regarding significance of chemical contamination without prior testing. Comment regarding Disposal Alternatives 2A and 2B being farmed wetlands.	*Location: Section 3.3.3.2.1* Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging activities. This previous testing has not revealed significant contamination of the sediments. However, the Corps proposes to implement a chemical testing program during the summer of 2000 or 2001 in accordance with the field sampling plan shown in Appendix M. Results of the test would then determine necess ary protection and mitigation measures during and following construction activities. *Location: Sections 3.3.5.2.3 and 3.3.5.2.4* Noted that Disposal Alternatives 2A and 2B are in farmed wetlands.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior, pg. 192	Comment regarding terrestrial habitat being inadequate.	*Location: Section 3.3.5.1.1* The Corps believe that the existing text in Section 3.3.5.1.1 is adequate for the decision affecting wildlife.
Department of the Interior, pg. 201	Comment regarding discussion of aquatic habitat being inadequate.	*Location: Section 3.3.5.1.2* See Section 3.3.5.1.6 Navigation Pools for further information on aquatic habitat.
Department of the Interior, pg. 205	Comment was raised to add the Harlequin Darter to reflect recent record of discovery.	*Location: pg. Table 3-44 Section 3.3.5.1.3* Harlequin Darter was added to Table 3-44.
Department of the Interior, pg. 209/ 210	Comment suggesting river substrate, structural habitat and aquatic habitat being combined.	*Location: Section 3.3.5.1.2* See Section 3.3.5.1.6 Navigation Pools for further information on aquatic habitat.
Department of the Interior, pg. 213	Comment was raised that Plan 3 construction area does not contain bald eagle habitat.	*Location: Section 3.3.5.2.1* The proposed area of Plan 3 construction activities does not contain bald eagle nesting habitat. However, bald eagle perching habitat may potentially occur along the forested shoreline, which is proposed for tree clearing and excavation. Therefore, construction activities may temporarily displace bald eagle perching.
Department of the Interior, pg. 214	Comment regarding loss of shoreline forest from bank shaving being replaced.	*Location: Section 8.3-* The loss of 5 acres due to bank shaping would be mitigated by replacement of 20 acres of riparian forest. Ten acres of the mitigation would be on government land, and the remaining 10 acres would be purchased from nearby riparian landowners. Details can be found in Appendix G.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior, pg. 215	Concern was raised about queuing during the construction period, impacts to fat pocketbook.	*Location:* *Section 3.3.5.2.1* During this time the main chamber would only be closed about 7 times, for only about 3 days each time. These closures are not nearly long enough to induce significant queues. The auxiliary chamber would be closed much more often, about 14 times, for intervals from days to 3+ months. The most significant queues occur during one closure in 2006 and tow closures in 2007 when both the main and auxiliary chambers need to be closed at the same time. All traffic would be stopped for two- three days for each of these three events. Queues could grow to as many as 43 vessels waiting in line in each direction. These queues may take 5 -7 days to dissipate following re-opening of the main chamber. Notices would be issued to the navigation industry in the year and weeks prior to the specific closures, however, it is unlikely that all traffic would be able to avoid the congestion caused by these closures. Another major concern would be if the main chamber should suffer an extended emergency closure during the 30 month construction period and, more specifically, during the last 17 months, when the auxiliary chamber would require significant closures. The Corps will conduct another mussel survey between the Myers L&D and mile maker 849.2 (one mile downstream of the Wabash River), in order to definitively locate *P. capax* mussel beds.
Department of the Interior, pg. 215	Issues were raised regarding justification of minimal fish mortality during blasting.	*Response:* Although detailed analyses of blasting impacts on fish have not been conducted, general measure to reduce potential mortality are described in the FEIS. The Corps will require a blasting plan which will include measures to avoid or reduce fish mortality impacts.
Department of the Interior, pg. 217	Concern was raised about hydraulic impacts on Little Pitcher Lake.	*Location:* *Section 3.3.5.2.2* Resolved by letter submitted by the IDNR.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior, pg. 218/ 219	Comment regarding inaccurate description of Indiana foraging area.	*Location: Section 3.3.5.2.3* Only cropland associated with adjacent woodland areas would be potential Indiana bat foraging areas.
Department of the Interior, pg. 220	Comment regarding significance of chemical contamination without prior testing.	*Location: Section 3.3.3.2.1* See response to comment from Department of the Interior pg. 188.
Department of the Interior, pg. 249-253	Concern with cumulative impacts analysis.	*Location: Section 4.0* See response from baseline conditions…
Department of the Interior; pg. 256	Concern was raised about the permanent loss of 5 acres of riparian forest.	*Response:* Given the data and technical information to date, the permanent loss of 5 acres of riparian forest is unavoidable.
Department of the Interior; pg. 268	Comment regarding tree cutting at Greenup and the Indiana bat.	*Location: Section 8.1* Similar to the migratory birds issue, trees would not be cut between April 15 and September 15 at the Myers project in order to avoid impacts to the Indiana bat and the evening bat.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior; pg. 269	Concern regarding mooring facilities as a minimization measure to avoid damage to shoreline habitats during construction.	*Response:* See the response above to comment pg. 215 in Section 3.3.5.2.1 of the FEIS. That response provides for certain measures to reduce problems associated with queuing downstream of the J.T. Myers site during construction.
Department of the Interior; pg. 268-271	Comment regarding Corps to commit to additional modeling that would estimate potential impacts to aquatic resources during and post-construction.	*Location: Section 8.4* A turbidity curtain would be used to minimize turbidity outside of the construction area and provide a means to conduct in-river construction throughout the year. Limiting in-river construction activity to the winter months would increase local aquatic and terrestrial impacts and increase the cost of the project. The curtain would be an underwater type silt fence that is currently being used on other Corps lock projects. Much of the excavation for the lock extensions would occur in the "slack-water" behind the existing riverwall upstream and downstream of the Greenup dam. A silt curtain would retain most of the sediments suspended by in-river work in this low-velocity environment. The Corps would monitor the functioning of the curtain to ensure protection of downstream resources. Much of the Greenup lock enhancement project requires work in the waters of the Ohio River adjacent to the current Greenup structure. Use of a silt curtain would minimize downstream impacts from suspended sediment during construction of the lock extension. This technique provides for a relatively brief construction period by allowing flexible and environmentally sound construction sequencing for in-river work. Limiting in-river work to winter months would quadruple the construction period for the project, delay recovery of local aquatic and terrestrial resources, and post-pone implementation of on-site mitigation. Seasonal restrictions on in-river construction would result in delays for temperature and water level controls and a reduction in the number of working construction days within the winter season. Substantial cost increases would occur from the extra mobilization/demobilization of large eq uipment and prolonged leases and contracts.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior; pg. 272	Comment regarding ESA in the regulatory compliance and permit requirements table.	*Location: Section 9.0; Table 9.1* The ESA also prohibits jeopardizing the continued existence of a listed species and also prohibits take, which includes harm of a listed species without authorization from the FWS.
Department of the Interior; pg. 280	Comment regarding Table 10-2 incorrectly listing employees.	*Location: Section X, Table 10-2* Steve Jose - Indiana Department of Natural Resources Tom Flatt- Indiana Department of Natural Resources
Department of the Interior; pg. C-5	Comment regarding Indiana bats foraging and roosting habitat.	*Location: Appendix C - errata sheet* Both sexes regularly forage in floodplain, riparian and upland forest, and may also use old fields and pastures with scattered trees. Females generally have a smaller foraging range than males, and the type of habitat used for foraging may reflect availability.
Department of the Interior; C-11	Concern regarding total mussel population.	*Location: Appendix C- errata sheet* The "total mussel population" statement was made in error and is not applicable to the Wabash River.
Department of the Interior; C-12	Comment regarding bank shaving and Indiana bat habitat.	*Location: Appendix C- errata sheet* Bank shaving will remove potential Indiana Bat roosting and foraging habitat.
Department of the Interior; C-12	Comment raised concerning possible *P. capax* habitat.	*Location: Appendix C- errata sheet* Based on current records, the Corps will be conducting another mussel survey on the Ohio River from mile 847.8 to 849.2. This survey will examine the area of the mouth of the Wabash River for *P. capax* and other species.
Department of the Interior, 212-214, 4.2.1, 4.3.1, 4.4.1 and 5.0	Comment regarding inaccurate description of Indiana foraging area.	*Location: Appendix C- errata sheet* See response to pg. 219 and pg. 220
Department of the Interior, Section 5.0	Comment concerning Indiana bat habitat.	*Location: Appendix C- errata sheet* The area proposed for bank shaving potentially contains Indiana bat roosting and foraging habitat.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Department of the Interior, Appendix G pg. 14	Comment regarding mitigation for temporary loss of riparian forest.	*Location: Appendix G- errata sheet* The 20 acres proposed for riparian forest mitigation for the bank shaving has been included as an additional mitigation measure. This is an environmental design feature and is not considered mitigation.
Department of the Interior, Appendix G pg. 19	Comment regarding tree-planting and survival on fill material.	*Location: Appendix G- errata sheet* Better species are available for planting on this elevated area. The area will not be a bottomland hardwood wetland, so obligate species will not be necessary. More appropriate riparian species will be substituted. In addition, measures will be taken to resolve any compaction problem on the constructed area, and suitable topsoil will be imported, or organic material incorporated into existing soil.
Department of the Interior, Appendix G pg. 18	Comment regarding potential indirect impacts from spoil disposal of Little Pitcher.	*Location: Appendix G- errata sheet* See Section 3.3.5.2.2
Department of the Interior, Appendix G pg. 19	Comment regarding impacts to wetlands from dredged material.	*Location: Appendix G- errata sheet* See Section 3.3.5.2.2

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Kentucky Natural Resources and Environmental Protection Cabinet (KY NREPC)	Concern was raised that the FEIS needed to address water quality certification, and dredge and fill permits.	*Location: Executive Summary* In addition to the 404 (r) authorization, the Corps regulations allow a 401 certification to be requested. This certification would be filed with the designated state agencies in order for each state to set water quality conditions necessary to evaluate the project impacts on water quality standards. The Corps is pursuing 401 certifications from the Commonwealth of Kentucky for the Greenup L&D project and from Indiana for the Myers L&D project. *Location: Section 3.2.3.2* In addition to the 404 (r) authorization, the Corps regulations allow a 401 certification to be requested. This certification would be filed with the designated state agencies in order for each state to set water quality conditions necessary to evaluate the project impacts on water quality standards. The Corps is pursuing 401 certifications from the Commonwealth of Kentucky for the Greenup L&D project. *Location: Section 3.3.3.2* Authorization under Section 404 (r) is being completed and a Section 404 (b) (1) evaluation has been conducted for the Myers L&D project. In addition to the 404 (r) authorization, the Corps regulations allow a 401 certification to be requested. This certification would be filed with the designated state agencies in order for each state to set water quality conditions necessary to evaluate the project impacts on water quality standards. The Corps is pursuing 401 certifications from Indiana for the Myers L&D project.
KY NREPC	Concern was raised that there is no mention of floodplain impacts in the Myers discussion.	*Location: Section 3.3.3.2.1* Construction of the new work boat mooring facility and graving yard would be performed partially in the Ohio River and partially on the Indiana bank. All on-land features, such as the new access road and laydown area, would be raised to minimize the risk of flooding, but would not exceed elevation 362 ft, which is the height of the existing access road. Construction of these features would not decrease the flood cross-sectional area by more than 5 percent from the level of the 100-year flood in the pre-project area because the large floodplain and floodway of Posey County, as well as the elevation restrictions of on-land construction. The floodplain at the project site is over a mile wide and the disposal material would be placed at a final elevation which would be lower than the top of the existing access road.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
KY NREPC	Concern was raised that there is no mention of floodplain impacts in the Greenup discussion.	As per the Preliminary Draft document, floodplains are discussed in several places in the document, the sections and page numbers are as follows: • Section 3.2.3.1 Affected Environment (under the *Hydrology* heading); pg. 111 • Section 3.2.3.2.1 600-ft Auxiliary Lock Extension (Plan 3) (under paragraph "The existing surface); pg. 115 • Section 3.2.5.1.5 Floodplains, pg. 126
Ohio Department of Natural Resources (ODNR)	Concern was raised with what impact increasing the size of the lock chamber would have on recreational users.	*Location: Sections 3.2.15.2.1 & 3.2.15.2.2* Despite the loss of some recreational boating and fishing opportunities during the construction period, the lock extension would not limit recreational use once completed. Upon completion, the lock extension would increase recreational boating and fishing opportunities during closures, as the extended chamber would minimize queuing along the shoreline and allow boaters to use the extension chamber for passage. Decreased queuing leads to decreased recreational interference. Passage through the extended chamber would occur according to priority between recreational boats and commercial craft. Recreational boating and fishing opportunities would remain relatively unchanged during normal lock operation, except that the extended chamber would be available for passage in addition to t he main chamber. 3.2.15.2.2 No Action. Under the No Action alternative, recreational boating and fishing opportunities would be lost with each closure of the main chamber. The increased queuing over time would impede on recreational traffic with each closure. Access to the lock and passage through the lock would be limited. This would constitute a significant impact to recreational resources. Recreational boating and fishing opportunities would remain relatively unchanged during normal lock operatio n.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
ODNR Division of Wildlife	Comment was raised that the Corps should include construction of an ADA compliant tailwater fishing pier and associated access.	*Location: Section 8.3* Appendix F – Engineering Design & Construction Specifications Which Avoid or Minimize Effects, page 14 (in the Preliminary Draft EIS), discusses the planned facility restoration. Improvement in fisherman access to the tailwaters along the Kentucky shoreline is planned and includes the construction of an American Disabilities Act (ADA) compliant fishing pier.
ODNR Division of Wildlife	Concern was raised that the new outlet culvert would degrade recreational use and cause the existing modified restricted zone to be reduced.	*Location: Section 3.2.15.2.1* The riverwall outlet structure may affect the disposition of the tailwater restricted zone. Adverse currents created by new outlet structure may limit reduction in the restricted tailwater zone. The resultant permanent decrease in potentially available recreational use areas would be an adverse impact. However, recreational impacts from the proposed outlet structure are largely dependent on the design of the outlet as well as the associated hydraulic modeling. Safe tailwater access is a concern and the USACE would coordinate with state resource partners throughout project development in order to ensure the safety of and minimize the risk to recreational users.
ODNR Division of Wildlife	Concern was raised that the placement of the land wall extension below the dam would negatively impact existing and future shoreline fishing.	*Location: Section 3.2.5.2.1* The backwater area would be impacted by the placement of "panel" walls or floating pontoon walls. Although the availability of backwater habitats would be limited as a result of construction activities, a section of backwater behind the extended land wall would be preserved. In addition, mitigation measures would likely include the restoration of this aquatic habitat.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Indiana Department of Environmental Management (IDEM)	Concern was raised that consideration should be given to what disposal method would be used for organic debris from land clearing and other waste materials.	*Location: Section 3.3.4.2.1* Fugitive dust would caused by the construction of the access road, hauling and disposal of debris from the laydown area, and the operation of the concrete batch plant. Impacts associated with fugitive dust would include obscuration of safety areas, such as the construction area, roads and highways. Fugitive dust could also have a potential effect on air quality by introducing of additional levels of particulate matter. The impacts of fugitive dust associated with the operation of the concrete batch plant would be minor. Frequent watering of the access roads and laydown areas would minimize if not alleviate most of the problems associated with fugitive dust. Also, chipping and mulching would be used as an alternate to debris burning of natural organic waste, which would further reduce impacts from fugitive dust. As a result, fugitive dust impacts would be adverse, but not significant.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
IDEM	Comment regarding deleting references to debris burning.	*Location: Section 2.2.4, Table 2-8* **600-ft Auxiliary Lock Extension** • Adverse, but not significant, degradation of air quality from construction, excavation, blasting, vehicle maintenance and operations, fugitive dust, lock operations, and **600-ft Auxiliary Lock Extension** • Adverse, but not significant: damage to vegetation and wildlife fro m clearing, sedimentation and erosion, HTRW' s, and accidental spills; *Location: Section 3.3.4.2* • Create emissions from the maintenance and operation ground vehicles thus degrading air quality; and • Affect air quality from lock operations. *Location: Section 3.3.5.2* Bullet was deleted. *Location: Section 3.3.5.3, Table 3-45* References to debris burning were deleted and the numbers in the table were reformatted. *Location: Section 3.3.8.2.1* Disposal of all construction materials, effluent, and other wast es would be handled in accordance with EM 385-1-1 Safety and Health Requirements Manual (USACE, 1996). Adherence to these regulations would prevent harm to construction workers and the public. *Location: Section 9.0, Table 9-1* Indiana Code dealing with O pen Burning was deleted.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
IDEM	Comment regarding 404(r) and 401 certification. Confusion as to intent to comply with water quality standards.	*Location**: Excutive Summary; Section 3.2.3.2 and 3.3.3.2*** This provides each state the opportunity to establish those conditions, through the certification process, they believe necessary to ensure that the projects to not violate state water quality standards.
IDEM	Issue was raised about violation of 404 (b)(1) guidelines with regard to contaminated sediments.	*Location: Appendix E* To further ensure that the sediments are not contaminated, a draft Quality Assurance Project Plan was prepared in September 1999 by the Corps of Engineers and is presently under review by the Indiana Department of Environmental Management. The plan provides for testing of the sediments proposed to be excavated in conjunction with the lock construction activities.
IDEM	Concern was raised regarding the potential for return water during dredging disposal to be subject to and NDEPS permit.	*Location*: *Section 3.3.3.2.3* In addition, the area would be bermed so that runoff from all dredged material would be contained. As there would be no return water, no NPDES permit would be required.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
IDEM	Issues were raised regarding a defined disposal location, containment and dewatering methods.	*Location: Section 2.2.3.4.1* The majority of the excavation for the wrap around culvert would take place in the dry and could be accomplished by conventional means. For those materials with moisture contents suitable for supporting the movement of construction equipment, conventional excavation may be performed using equipment such as self-loading scraper pans, backhoes, trucks, and bulldozers. Excavation in materials with moisture contents unsuitable for conventional equipment would require excavation with draglines or other appropriate equipment. Excavation for the near site work station (temporary construction moorage area), approach areas, wall monoliths, and miter gate monoliths and sill structure, would, where feasible, be performed from the shoreline using draglines or other suitable equipment. Excavation of materials in the water, outside the reach of conventional shore-based equipment, would require dredging. Due to the added costs and disposal considerations required when dredging, dredging would be minimized, and conventional excavation would be utilized to the maximum practical extent. In cases where dredging of overburden material is required in addition to drilling and shooting limestone (e.g. for the float-in land wall monolith construction), clamshell dredging in preferable. Drilling would be most effective if carried out with some or all of the overburden left in place, since the casing could be seated. Also, the blasting would be more effective, with greater fragmentation. Using this approach, much of the silt and sand would necessarily be dredged with the broken limestone, and a clamshell dredge would be required. The clamshell bucket should be without teeth and tight fitting so as to prevent loss of material. Excavated material would be loaded onto scows (with sides) for transport to the stockpile of disposal area. At the unloading site, a shore-based clamshell would unload, although an alternative would be a scoop loader on the scow and a conveyor belt. The material would then be stockpiled, if necessary, separating it as reasonable as practical and allowing it to drain. This would be done with a scoop loader, which would also load to trucks for hauling to the disposal area. Appropriate precautions would be taken to limit runoff and containment of the excavated material in the stockpile and disposal area. It is assumed that excavated rock would be recycled and reused by the contractor and would, therefore, not require disposal. A significant portion of the excavated material would be reused as backfill. The remainder of this material would be spoiled within the 94-acre disposal area identified as Disposal Alternative 1A at the J.T. Myers site. The top of the disposal mound would be limited to elevation 358 or below, which would be below the existing road elevation at the site.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
IDEM	Concerns regarding sediment testing at Myers.	*Location: Section 3.3.14.2.1* Future testing would be accomplished as outlined in the field sampling plan found in Appendix J.
Indiana Department of Natural Resources (IDNR)	Issue was raised concerning need for flood control act permit.	*Location: Section IX* Flood Control Act (IC 14-28-1) was added into Section IX.
IDNR	Concern was raised about Indiana state listed species found near Myers disposal sites.	*Location: Section 3.3.5.1.3, Table 3-44* See page 209 for additions: Adjacent to Alternative Disposal Site 2 and Adjacent to Alternative Disposal Site 3 in table 3 -44. *Location: Section 3.3.5.1.3* Other Indiana state listed species may be impacted by disposal activities (see Table 3 -44). *Location: Section 3.3.5.2.3 through 3.3.5.2.6* Disposal Alternatives may adversely affect state -listed species found in Table 3 -44.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
IDNR	Issues regarding disposal site elevation impacts on hydrology of Little Pitcher Lake and creation of shallow depressions.	*Location: Section 3.3.5.2.2* The disposal area would be raised 7 ft. The Uniontown, KY-IN quad sheet shows that all drainage enter Little Pitcher Lake from the north or the east. The area to the south (the disposal area) is very flat and ground slopes to the lake only from the small wooded area immediately adjacent to the stream. The disposal area should have no hydrologic impact on Little Pitcher Lake. However, raising the Section 1135 site would have an impact by reducing the amount of backwater flooding from the Ohio River. This would mean less flooding to this site, which should be beneficial to the re-established prairie community. However, the change in elevation would cause a minor loss of floodplain. Since the disposal site would be totally restored with a higher quality and more productive Section 1135 area than exists, no significant impact to floodplain habitat is expected. Ground compaction problems would be resolved by the use of low ground pressure equipment. This equipment would ensure that adequate nutrients and organic material are present for this area. The disposal site would also be graded such that shallow depressions remain after construction. This microtopography would improve wildlife habitat by providing shallow watering areas during dry periods.
IDNR	Issues were raised concerning loss of riparian habitat and insufficient in-kind mitigation.	*Location: Section 8.3* The loss of 5 acres due to bank shaping would be mitigated by replacement of 20 acres of riparian forest. 10 acres of the mitigation would be on government land, and the remaining 10 acres would be purchased from nearby riparian landowners. Details can be found in Appendix G.
United States Department of Agriculture	No reference to compliance with the Farmland Protection Policy Act Inconsistencies with wetland determinations	*Location: Section 3.3.2.1.1* A portion of the project site (1A) was historically used as cropland, however this area was converted sometime between 1953 and 1965. The sites (2&3) are used for agriculture; however the sites are currently not recommended for disposal. Thus, the Corps has complied with the requirements of the Farmland Protection Policy Act. *Response:* The site was inspected on April 5, 2000 and the analysis failed to reveal any hydric soil indicators or hydric soil inclusions.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Sierra Club	Failure to address system-wide impacts, establish baseline condition	*Location: Section IV* A study of system-wide cumulative effects will be conducted for the Ohio River in the next report dealing with major navigation improvements on the mainstem. This study will include appropriate studies to assess past, present and reasonably foreseeable future actions by the Corps and others. The 1950' s brought about great change to the Ohio River; Greenup L&D and John T. Myers L&D were added to the navigation network. The establishment of these two locks and dams changed the habitat of the areas due to the river pool elevations resulting from impoundment. (continued in Section IV)
	Failure to address operations and maintenance	*Location: Section 1.4* This document only addresses the incremental differences between impacts that may be caused by these projects and on-going impacts caused by Operation and Maintenance (O&M) of the existing navigation system. Discussion of existing and future O&M impacts is beyond the scope of this study.
Save Our Rivers	Prefer the use of Disposal Alternative 1A	*Location: Section 2.2.3.5.1* Based on further evaluation, since the Draft EIS has been circulated and comments considered, the Corps recommends that Disposal Alternative 1A be the preferred alternative. Further evaluation of the disposal sites are confined to this alternative in the FEIS.
	Concern was raised regarding dredged material contamination	*Location: Section 3.3.3.2.1* Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging activities. This previous testing h as not revealed significant contamination of the sediments. However, the Corps proposes to implement a chemical testing program during the summer of 2000 or 2001 in accordance with the field sampling plan shown in Appendix M. Results of the test would th en determine necessary protection and mitigation measures during and following construction activities.
Ohio Department of Public Utilities	Issue was raised regarding potential for the project to require alteration to the hydropower facility	*Response:* The current Greenup project will not require relocation of any parts of the hydropower facility including the transmission lines.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
United States Environmental Protection Agency	Validity of the purpose and need; and increased capacity issues were raised	*Location: Section 1.2* *Location: Section IV* A study of system-wide cumulative effects will be conducted for the Ohio River in the next report dealing with major navigation improvements on the mainstem . This study will include appropriate studies to assess past, present and reasonably foreseeable future actions by the Corps and others.
	Failure to address system-wide impacts	*Location: Section 2.1.3.4.1* Therefore, the extended auxiliary chamber would not be necessary to serve future demands. Rather the auxiliary chamber would be expected serve as a "main chamber" during maintenance outages or inspections of the existing main chamber.
	Use of auxiliary chamber during times other than outages	*Location: Section 8.2 (Table 8-1) and Section 8.4* Minimization and monitoring measures and procedures a re explained.
	Soil movement impact minimization measures should be written into construction contracts to be sure they are implemented.	*Location: Section 3.3.3.2.1* An environmental protection plan would be implemented to minimize construction effects including those from soil erosion, sediment re -suspension, and POL spills. Best management practices, such as the use of s ilt fences and hay bales, would minimize soil erosion and runoff. Silt curtains would be employed to localize sediment re -suspension effects during dredging, bank shaving, and the effects of blasting activities. A spill control and prevention plan would be implemented to minimize spills. Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging activities. This previous testing has not revealed significant contamination of the sediments. However, the Corps proposes to implement a chemical testing program during the summer of 2000 or 2001 in accordance with the field sampling plan shown in Appendix J. Results of the test would then determine necessary protection and mitigation measures during and following construction activities.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
Hoosier Environmental Council	Prefer the use of Disposal Alternative 1A	*Location: Section 2.2.3.5.1* Based on further evaluation, since the Draft EIS has been circulated and comments considered, the Corps recommends that Disposal Alternative 1A be the preferred alternative. Further evaluation of the disposal sites are confined to this alternative in the FEIS.
	Concern was raised regarding dredged material contamination	*Location: Section 3.3.3.2.1* Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging activities. This previous test ing has not revealed significant contamination of the sediments. However, the Corps proposes to implement a chemical testing program during the summer of 2000 or 2001 in accordance with the field sampling plan shown in Appendix M. Results of the test wou ld then determine necessary protection and mitigation measures during and following construction activities.
Brauser Farms	Increased barge traffic	*Location: Executive Summary* Concern has been expressed about the potential increase in navigation traffic that could result from the construction of the lock improvement projects. Economic studies demonstrate that navigation traffic would not increase because of lock extensions.
	Loss of recreational facilities	*Response:* The replacement of the recreational facilities was deferred until after the completion of the lock improvements.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
KY NREPC – Division of Waste Management	Permit requirements; underground storage tank remediation, disposal in floodplain issues were raised	Response: All J.T. Myers waste will be disposed of in the State of Indiana and waste material issues have been addressed with those state agencies. *Location: Section 3.2.14.2.1* If any underground storage tanks were encountered during future activities, it will be properly reported and remediated. *Location: Section 3.2.3.2.1* In the vicinity of the Greenup project, the floodway is limited to the top of the river banks. Therefore, no fill will occur in the floodway. However, the disposal site is in the floodplain. A potential analysis under Executive Order 11988 will be performed during the Preconstruction Engineering Design phase of our study. Due to the width of the floodplain, no significant impacts are expected.
KY Department of Fish and Wildlife Resources	Concern was raised about the need for mitigation at the head of Stewart's Island	*Location: Appendix G* Based on comment received from Kentucky Department of Fish and Wildlife Resources, protection of the eastern shore on Stewart's Island has been substituted for protection of the head of the island.
Kentucky Heritage Council	Comments were received regarding J.T. Myers cultural resource coordination	*Response*: The potential for impacting cultural resources is only projected on the Indiana side of the Ohio River. Should any project actions require effort on the Kentucky bank, the Corps will coordinate with the State Historic Preservation Office. A Programmatic Agreement addressing all activities associated with the ORMSS is being developed.
IDNR	Comments were received regarding potential surface site in the J.T. Myers project area.	*Location: Section 3.3.13* An archaeological surface reconnaissance would be conducted if archaeological site 12Po802 were determined to be within the construction work limits of the project area. This surface study would be completed in accordance with applicable laws and regulations. In addition, discovery of archaeological artifacts during construction, demolition, or earthmoving activities would be reported to the Division of Historic Preservation and Archaeology in accordance with Indiana State law.

Comment Letter	Subject of Comment	Response to Comment and FEIS Document Location
West Virginia Public Port Authority	Letter of support	No response required.
Vigo County Soil and Water Conservation District	Letter of support	No response required.
Midland Eastern Enterprises	Letter of support	No response required.
Blue Danube Inc.	Letter of support	No response required.
FirstEnergy	Letter of support	No response required.
Mt. Vernon Barge Service, Inc.	Letter of support	No response required.
The Propeller Club of the US	Letter of support	No response required.
Kentucky Heritage Council	Letter of support	No response required.
Mellon Bank	Letter of support	No response required.
Greater Lawrence County Area	Letter of support	No response required.
Old National Bank	Letter of support	No response required.
Jackson L. Higgins	Letter of support	No response required.
Mt. Vernon Area Chamber of Commerce	Letter of support	No response required.
DINAMO	Letter of support	No response required.
Department of Health & Human Services	Letter of support	No response required.
Four Seasons Motel	Letter of support	No response required.
Indiana Port Commission	Letter of support	No response required.

United States Department of the Interior

OFFICE OF THE SECRETARY
OFFICE OF ENVIRONMENTAL POLICY AND COMPLIANCE
Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303

February 18, 2000

ER-00/44

Ms. Veronica Rife
U. S. Army Corps of Engineers
P. O. Box 59 - ATTN: PM-C
Louisville, KY 40201

Dear Ms. Rife:

We have reviewed the draft Interim Feasibility Report and the draft EIS for the J. T. Myers and Greenup Locks Improvements and offer the following comments.

This subject draft interim feasibility report (draft report) and Draft Environmental Impact Statement (DEIS) evaluate alternatives for the two highest priority structures needing improvements, J.T. Myers L & D in Posey County, Indiana, and Greenup L & D in Greenup County, Kentucky. The draft report recommends that at both projects, the existing 600-foot auxiliary lock be extended to 1200-foot in length, and that a miter gate quick change-out system be installed to provide faster repairs to the lock gates during future maintenance periods. In addition, for Greenup L & D only, a major rehabilitation of the main lock chamber is recommended. Except for the without project alternative, the recommended 600-foot lock extension alternatives are the only ones carried through full analysis. The lock extension alternatives involve minor variations in a 600-foot lock extension alternative, including variations in the phasing of project construction, and alternative spoil disposal options. The draft report and DEIS do not predict that these projects will increase the level of navigation traffic experienced on the river. Instead, they find that the lock extensions will reduce the cost of navigation delays experienced during routine lock closings for maintenance and repairs. The estimated cost of these projects is $174.7 million for J.T. Myers L & D, and $193.9 million for Greenup L & D.

General Comments

Through the ongoing Ohio River Mainstem Systems Study (ORMSS), the U.S. Army, Corps of Engineers (Corps) is developing an investment plan to identify foreseeable maintenance, rehabilitation and new construction needs for the navigation infrastructure of the Ohio River until the year 2060. It was believed that the resulting comprehensive Environmental Impact Statement for the ORMSS would ensure that both navigation and environmental systemic needs and impacts were adequately considered prior to Congressional authorization and project implementation.

However, the subject draft report and DEIS for J.T. Myers and Greenup locks improvements were developed outside of the Corps' ongoing Ohio River Mainstem Study and, as such, do not address the cumulative effects of a series of navigation improvements to the fish and wildlife resources within the Ohio River basin. The Fish and Wildlife Service (FWS) outlined its concerns for this and another ongoing "interim" study (Emsworth, Dashields and Montgomery) to the Corps in a letter dated October 25, 1999, signed by the FWS's Regional Directors for Regions 3, 4 and 5. As a result of the letter and other discussions between the two agencies, the FWS worked with the Corps to outline a strategy that would address system-wide cumulative impacts to fish and wildlife resources in the upcoming feasability report/environmental impact statement for "interim projects" at Emsworth, Dashields and Montgomery.

Cumulative impacts to fish and wildlife resources from all of the proposed navigation improvement projects under consideration may be adequately assessed in the upcoming Emsworth/Dashields/Montgomery (EDM) interim report and in the final ORMSS report, based upon:

1) an agreement by the Corps on the extent to which cumulative impacts will be addressed in the Corps' future interim EDM report;

2) the studies that the Corps will undertake to analyze navigation-related cumulative impacts to fish and wildlife resources, including studies on fish passage, fish winter habitat use; navigation-related erosion of islands; and navigation-related impacts to aquatic resources (fish and mussels); and,

3) the Corps' commitment that any necessary adjustments/modifications to the proposed navigation improvement projects, including Greenup and J.T. Myers, can be made based upon findings of the cumulative effects analysis prior to the Corps making any irreversible/ irretrievable commitment of resources that would foreclose consideration of less environmentally damaging alternatives.

Presently at Myers Locks and Dam, with the existing1200-foot lock and 600-foot lock, there is an average delay per tow of 45 minutes, a delay which can only be expected to increase with the projected increase of tow traffic. At Smithland Locks and Dam, which has two 1200-foot locks and approximately the same traffic level, that delay is approximately 10 minutes per tow. The document states that the delay costs attributable to not having a second 1,200 foot lock chamber at J.T. Myers is approximately $1.5 million per year (a year in which no major maintenance occurs at the facility). The draft Environmental Reference Data section states "....a second 1200-foot-long chamber at J.T. Myers Locks and Dam would yield a reduction in tow transit costs on a day-in, day-out basis, and the value of this benefit would grow over time as traffic levels increase." Although the economic models are not predicting enhanced traffic due to the extension to a 1200-foot lock at J.T. Myers, cumulatively, when the benefits of all of the proposed lock extension projects are considered, it appears likely that the locks improvements will decrease transportation costs which could result in

project-related increases in traffic on the river. In addition, we question why the benefits from decreasing the costs of normal delays was not included in the cost/benefit analysis.

The Fish and Wildlife Coordination Act directs the Corps to incorporate into the project plan such justifiable means and measures for wildlife purposes as the Corps finds should be adopted to obtain maximum overall project benefits. Further, Section 906(e) of the Water Resources Development Act (WRDA) of 1986, as amended by Section 107(b) of WRDA 1992, directs that the first costs of fish and wildlife enhancement projects, when recommended in a report to Congress, are all federal provided that the enhancement benefits are national in character, will benefit federally listed endangered or threatened species and/or will be located on National Wildlife Refuge lands.

The FWS's November 10, 1999, Draft Fish and Wildlife Coordination Act Report (DFWCAR) outlined a number of fish and wildlife enhancement opportunities that could be undertaken in the project. Implementation of some or all of the suggested actions would help the Corps to ensure that equal consideration is given to fish and wildlife during project planning and to achieve maximum overall project benefits. A number of suggested actions are included in the project plans, either as mitigation for project-related impacts or as environmental design features.

The FWS recommends that the Corps consider adopting two more of the identified natural resource objectives as project objectives, and undertaking selected projects to meet those objectives:

- Minimize physical impacts and pollution from barge traffic and barge fleeting. In particular, the installation of mooring cells or buoys at critical locations where barges temporarily moor over mussel beds or in other important resource areas that benefit interjurisdictional fishes, federally listed endangered mussels and National Wildlife Refuge lands. These areas could be identified on a pool-by-pool basis, in consultation with the FWS, the appropriate state conservation agency(ies) and the navigation industry.

- If data indicates, restore and/or enhance opportunities for fish passage at Greenup Locks and Dam and J.T. Myers Locks and Dam. Dams typically prevent migratory/highly mobile species such as paddlefish from moving freely throughout the river to exploit the variety of habitats necessary for different parts of their life cycles. Lock chambers and high flows facilitate fish passage to some extent, but their operation is generally not designed to facilitate fish passage, and passage may not be available at critical times in the life cycles of migratory fishes. In addition, freshwater mussels have an obligate parasitic stage during which they are attached to the gills of a specific host species of fish. These mussel species are dependent on their host fish for early development and dispersal throughout their natural range. If host fishes are prevented from moving upstream or downstream during critical life stages of mussel reproduction and development, then this mechanism of development and dispersal is disrupted.

As part of the studies to identify project-related cumulative effects, the FWS is working with the Corps to undertake a study to determine if any locks and dams on the Ohio River mainstem appear to obstruct fish movements on the river. The FWS would like assurance that, if this study determines Greenup and/or J.T. Myers Locks and Dams may be obstructing fish movements, the project's design and/or operation could be modified to enhance fish movements, if feasible.

We have no objection to the alternatives selected in this document. We do, however, continue to maintain objections to the Corps' pursuit of interim project reports in lieu of completing the full Mainstem report, and to the approach to cumulative and system-wide impacts taken in this report.

It appears that most of the avoidance and mitigation measures recommended in the Fish and Wildlife Coordination Act Report have been included in the recommended project alternatives. With incorporation of these measures, many of the anticipated impacts to fish and wildlife resources will be adequately mitigated. Exceptions to this statement are noted below.

DRAFT FEASIBILITY REPORT

Specific Comments

Page 10-6: See discussion above regarding delays at J.T. Myers versus delays at Smithland Locks and Dams.

Page 12-1&2, Tables 12-1 and 12-2. The two tables are confusing and should be further clarified in the final document.

Page 12-6; Ohio River SystemEnvironmental Impacts: Reference discussion above and discussion regarding pages 249-253 in the Draft Environmental Impact Statement.

Page 12-12/15: Table 12-7 indicates that, for construction at J.T. Myers, (compensatory?) mitigation will be used to offset losses of wetland/riparian and terrestrial habitat, however this concept is not addressed in the narrative description of mitigation measures on Page 12-7, which addresses only aquatic habitat mitigation.

Page 13-7; Figure 13-1: This figure demonstrates that in the future without project scenario for Greenup Locks and Dam, the existing lock capacity cannot meet traffic demands in the latter 25 years of the analysis period. Therefore, we assume that, with extension of the auxiliary chamber to 1200 feet and the subsequent increase in capacity, traffic will not need to be diverted from the river. In other words, the lock extension will facilitate increased traffic on the river.

Page 15-4; Endangered Species: This section should be more specific by indicating whether the reference is to Federally listed threatened and/or endangered species, or state listed species, or both.

Page 15-5; Ohio River System Environmental Impacts: Reference discussion above and discussion regarding pages 249-253 in the Draft Environmental Impact Statement.

Draft Environmental Reference Data

The document states that, for all three plans under consideration, "the existing surface water hydrology would not be moved or altered during construction or operation activities." We are unsure if this means that there are no predicted changes in water flow, sedimentation pattern or scouring patterns. We are unaware of any modeling done to substantiate such a finding. We recommend that the Corps conduct modeling to determine if there may be changes in water flow, sedimentation pattern and/or scouring patterns, and an analysis of potential impacts to fish and wildlife resources from any predicted changes for both J.T. Myers and Greenup projects. If necessary, measures should be identified that would avoid or minimize any adverse impacts and mitigation identified for any unavoidable impacts.

Section 3.2.4.1.3 Threatened, Endangered and Other Protected Species. The final document should be changed to indicate that the ring pink (mussel) is a federally-listed endangered species.

DRAFT ENVIRONMENTAL IMPACT STATEMENT

General Comments

The Service does not believe that an adequate description of the baseline condition for fish and wildlife resources was presented in this document. Establishment of a baseline condition is necessary to evaluate and compare the impacts to fish and wildlife resources between the "future without project" and the "future with project." As discussed in the 1999 U.S. Environmental Protection Agency document "Consideration of Cumulative Impacts in EPA Review of NEPA Documents", use of a "benchmark" or "baseline" for purposes of comparing conditions is an essential part of any environmental analysis. "The concept of a baseline against which to compare predictions of the effects of the proposed action and reasonable alternatives is critical to the NEPA process." (CEQ, 1997) To determine how the project will affect the resource's ability to sustain itself, the NEPA document should include a description of the baseline condition that considers "...how conditions have changed over time and how they are likely to change in the future without the proposed action". (CEQ, 1997)

The draft report defines baseline to include predicted future increases in navigation traffic above the levels currently experienced on the system. The final document should assess the health of the project area, then predict the future health with and without the proposed projects. As taken from EPA

(1999): "Designating existing environmental conditions as a benchmark may focus the environmental impact assessment too narrowly, overlooking cumulative impacts of past and present actions or limiting assessment to the proposed action and future actions (McCold and Saulsbury 1996). For example, if the current environmental condition were to serve as the condition for assessing the impacts of relicensing a dam, the analysis would only identify the marginal environmental changes between the continued operation of the dam and the existing degraded state of the environment. In this hypothetical case, the affected environment has been seriously degraded for more than 50 years with accompanying declines in flows, reductions in fish stocks, habitat loss, and disruption of hydrologic functions. If the assessment took into account the full extent of continued impacts, the significance of the continued operation would more accurately express the state of the environment and thereby better predict the consequences of relicensing the dam."

In addition, the DEIS does not discuss the potential secondary and indirect effects of the proposed projects. Secondary and indirect effects may include changes in barge approach patterns, increased development of barge loading facilities in the surrounding area, and alterations in flow patterns around the facility that could alter locations subject to operations and maintenance dredging or habitat conditions in downstream areas. An assessment of the potential secondary and indirect effects should be conducted and included in the final document, along with any mitigation necessary to compensate and/or avoid impacts to fish and wildlife resources.

Specific Comments

Page ii; Major Conclusions: The first and second paragraphs state that the "No Action" alternative would have adverse impacts on soils, water quality, etc. This section should be expanded to indicate how the "No Action" alternative would adversely impact the listed parameters.

Page 33; Bank Protection: The text states that the need for bank protection from construction or operation of this project would be identified at a later date. Other lock upgrades recently conducted by the Corps have caused large lengths of riverbank near the lock approach to become unstable. This has resulted in removal of existing riparian vegetation and abandonment of plans for "bioengineered" bank stabilization, in favor of standard riprap treatments. Additional losses of riparian habitat from the continuing operation and maintenance of these projects could be a significant impact and should be considered in this EIS. Modeling should be conducted to evaluate the extent of this impact, and proactive measures to reduce wave action on these banks or avoid the loss of riparian vegetation should be undertaken.

Page 76, 2.2.3.5.1.: The DEIS states that under Disposal Alternative 1A, bottomland hardwoods would be planted to replace the filled scrub-shrub areas. We support the concept of tree-planting, but we question whether bottomland hardwoods would be the appropriate species to plant on 3 to 6 feet of additional fill material. We also question whether the existing "topsoil" would provide

quality soil strata for re-establishment of bottomland hardwood species, given that the "topsoil" was the result of previous disposal of material during lock/dam construction activities.

Page 76; 2.2.3.5.2.: The DEIS should note that Disposal Area 2 consists of farmed wetlands.

Page 82; 2.2.3.5.5.: For Disposal Alternative 3B (planting of bottomland hardwoods), we recommend that the spoil material be spread unevenly, creating shallow depressions and sloughs, to increase habitat diversity. An evaluation should be done to determine if bottomland hardwoods will grow successfully on 1.5 to 3 feet of fill material.

Page 84; Table 2-8, Biological Resources: The DEIS states that habitat loss under Disposal Alternative 2A would be significant but would be mitigated. If this alternative would fill 143 acres of farmed wetland to a depth of 2 to 4 feet, as stated on page 76, the DEIS should be more specific concerning how the Corps would propose to provide mitigation for such a large wetland loss.

Page 103; 3.2 Greenup, 3.2.1 Environmental Conditions: In the third paragraph it states that no mussel beds were found within 0.5 miles upstream of the dam etc. The final document should define "mussel bed."

In the following paragraph, and in Table 3-18, "catspaw" should be changed to "purple catspaw pearly mussel."

Page116; 3.2.3.2.2 No Action: The last paragraph should state whether the negative impact from queuing is significant, and why.

Page 123; 3.2.5.1.2.2 Wildlife: To assist the average reader, mile markers on the Ohio River should include county and other landmarks.

Page 129; 3.2.5.2 Environmental Consequences: This section should have separate lists of impacts for both Action and No Action alternatives for clarification.

Page130: Although we concur with the stated objective of avoiding impacts to migratory birds, it is unclear what type of measures would be used to "discourage migratory birds from nesting in the proposed project site."

Monitoring of turbidity levels as a result of dredging and construction activities should be included as part of the project plan. These activities, when possible, should be scheduled to coincide with the dormant period for native mussels, November to March, to further reduce the potential for adverse impacts to downstream mussel beds and fish spawning areas.

Pages 132 and 216: We did not receive the results of the NAVPAT analysis for review. In addition, although the document states that the results for the Greenup project are included in the Environmental Reference Data Appendix to the Main Report, we could not locate the results in the Appendix. Therefore, this portion of the study could not be reviewed in detail. Nevertheless, text on pages 132 and 216 briefly discuss the results of the analysis. The text states that the effects of movement of tows attributable solely to the extension of the 600-foot lock to a 1200-foot lock would result in a 17-18 percent loss of habitat value for paddlefish and sauger larval stages in the Meldahl pool, and a 20 percent loss to these values in the Smithland pool. Evidently, a NAVPAT analysis of the existing on-going impacts was not conducted so the cumulative effects of additional project-related impacts cannot be assessed. However, the combined impact of two different projects each incurring this level of reduction in spawning habitat value, particularly for paddlefish, a species that is not abundant in the system, would appear to be significant, when taken into consideration with other ongoing and predicted future impacts (i.e., existing and future without project traffic). In addition, these impacts do not appear to be included in the Summary of Impacts table located in Section 3.2.5.3. The final document should evaluate the severity of these impacts and describe specific measures that will be used to mitigate or avoid these impacts. Also, we understand that the "baseline" analysis of ongoing impacts will be done using the NAVPAT model for the ORMSS cumulative effects analysis.

Page 133; Table 3-20 Summary of Greenup: In the last table entry on the page, we believe that turbidity and/or release of contaminants would have an impact on the aquatic biota, even if it may be insignificant.

Page 186/187; 3.3.3.2.2.: Here the DEIS states that the ground level at Disposal Site 1 would be raised 7 feet, whereas on page 76 the estimated ground surface rise is 3 to 6 feet. A better explanation is needed as to how keeping the raised ground surface below the access road crown elevation "...would not impact the flood cross-sectional area".

Page 188; Table 3-38, Summary of Impacts: The DEIS states that potential construction impact #3, affect of dredging on water quality, would be adverse but not significant. It should be noted that the extent of impacts cannot be fully evaluated until sediment testing is completed in accordance with the requirements of the Indiana Department of Environmental Management (IDEM).

For Disposal Alternatives 2A and 2B, it should be noted that impacts include filling of farmed wetlands.

Page 192; 3.3.5.1.1.: The discussion of terrestrial habitat is inadequate. This section should describe how the cover types on project lands and potential disposal sites provide habitat for wildlife, especially endangered/threatened species and other species of concern.

Page 201; 3.3.5.1.2.: The discussion of aquatic habitat is inadequate. The reference to the recent mussel survey may be sufficient for a description of mussel habitat, but this section should also address fish habitat in the affected river reach. Additionally, the endangered fat pocketbook mussel is known to occur in the Ohio River near Wabash Island.

Page 205; 3.3.5.1.3.: Subsequent to preparation of the DFWCAR, we learned of a recent record of the harlequin darter (*Etheostoma histrio)* from the Ohio River near the mouth of the Wabash River (Les Frankland, Illinois DNR, personal communication). As this species is listed as endangered in Indiana, the final report should note its presence in the project vicinity.

Page 209/210; 3.3.5.1.6, Navigation Pools: This section provides a discussion of river substrate and structural habitat. We recommend that it be combined with Section 3.3.5.1.2, Aquatic Habitat.

Page 213; 3.3.5.2.1.: The DEIS states that the proposed Plan 3 construction area "...does not contain bald eagle nesting or roosting habitat." We recommend that this statement be modified to indicate that potential eagle perching habitat does occur along the forested shoreline proposed for tree-clearing and excavation.

Page 214: The DEIS states that mitigation for the proposed downstream bank shaving area would consist of aquatic habitat features and reforestation of the river bank. We request that all loss of shoreline forest be replaced, at increased acreage ratios, to compensate for loss of habitat units during the regrowth period.

Page 215: The DEIS states that estimated main lock closures during construction (four closures at about 3 days per closure) are not nearly long enough to induce significant queues. Because the downstream queuing area is known to contain a federally endangered mussel, the fat pocketbook (*Potamilus capax*), we request a more detailed analysis leading to this conclusion.

The text does not provide sufficient information to justify that fish mortality impacts as a result of underwater blasting would be minimal. For example, the shallow shoreline habitats below Greenup Dam at RM 341 to 344 are major fish spawning areas. Sauger and paddlefish utilize both sides of the river at J.T. Myers (L. Frankland, IL DNR, pers.comm.). Numerous young sauger and young white bass have been collected and/or observed below the locks at J.T. Myers (T. Stefanavage, IN DNR, pers.comm.). Sauger spawn in the substrate along the river. Paddlefish may use the gravel bar on the KY side. The final report should describe the potential for, and extent of, impacts that blasting would have on these spawning areas or to the fish utilizing these areas. The final report should include information relevant to levels of blasting impacts that are known to effect various fish species and life stages and then compare these levels to those expected to occur as a result of project construction.

Finally, in the final document, the Corps should consider additional modeling to determine if there may be changes in tow approach/departure alignments and flow/scouring/sedimentation characteristics downstream from the lock for both J.T. Myers and Greenup, and an analysis of potential impacts to fish and wildlife resources from any predicted changes. If necessary, measures should be identified that would avoid or minimize any adverse impacts and mitigation identified for any unavoidable impacts.

Page 217; 3.3.5.2.2.: The environmental consequences discussion for Disposal Alternative 1A should address potential hydrologic impacts on Little Pitcher Lake and adjacent wetlands. Spoil disposal may alter the watershed and drainage characteristics of these water resources.

The document states that, "to the extent possible," tree clearing will occur outside the occupancy period for Indiana bats. In order to insure that impacts to this species are avoided, tree clearing must be conducted outside of this time period. If this is not possible, additional consultation with the FWS must be initiated.

Page 218/219: The discussion of Disposal Alternatives 2A, 2B, 3A and 3B refers to cropfields as "...potential Indiana and evening bat foraging habitat." As discussed in the November 11, 1999 DFWCAR, this description is incorrect and should be modified or deleted. Based on the best available knowledge, Indiana bats forage primarily in forested areas within the tree canopy. Any foraging in cropfields would be in association with adjacent wooded areas, typically restricted to field edges, and should not be considered as significant for the species.

Page 220; Table 3-45, Summary of Impacts: Reference comments regarding page 188.

Page 249 - 253: We find the discussion of potential cumulative impacts from the Greenup and J.T. Myers lock extension projects inadequate.

EPA guidance documents specify that cumulative impacts should take into account the compounding effects of all actions over time, particularly when the effects of an action are added to or interact with other effects in a particular place within a particular time. In addition, the guidance states that the cumulative impacts analysis should adequately consider the following:

- Whether the environment has been degraded and if so, to what extent;
- Whether ongoing activities in the area are causing impacts; and
- The trends for activities and impacts in the area.

The current cumulative impacts analysis makes no attempt to evaluate these factors.

Basically, the section states that the cumulative effects of these two projects on the Ohio River mainstem system's fish and wildlife resources are minimal. CEQ regulations define cumulative effects

as, "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions" (40 CFR 1508.7). Scientific evidence increasingly demonstrates that the most devastating environmental effects may result not from the direct effects of a particular project, but from the combination of individually minor effects of multiple actions over time. Given the complex dynamics of river basin systems, assessing the overall cumulative effects of the Ohio River Mainstem System prior to any specific project approval becomes even more critical. Furthermore, as the courts have held in LaFlamme v. Federal Energy Regulatory Commission 852 F.2d 389, (9th Cir. 1988), consideration of cumulative impacts must take place before an agency makes a decision on a project. The Senate Report that accompanied NEPA passage states that "Important decisions concerning the use and the shape of man's future environmental continue to be made in small but steady increments which perpetuate rather than avoid the recognized mistakes of previous decades." Senate Report No. 91-269, 91st Cong. 1st Sess. 5(1969). A federal agency's compliance with NEPA should help to avoid these mistakes.

However, as stated earlier, we believe that cumulative impacts to fish and wildlife resources may be adequately assessed in the upcoming Emsworth/Dashields/Montgomery (EDM) interim report and in the final ORMSS report. Therefore, we recommend that this section be modified in the final document to state that the cumulative effects of Greenup/Myers projects, when taken into consideration with other lock and dam projects under consideration in the ORMSS, are unknown at this time. A cumulative effects analysis will be undertaken in the next feasibility study/environmental impact statement prepared for EDM, which will include a review of impacts from the proposed Greenup and Myers projects. The cumulative effects analysis will continue to be refined during the Ohio River mainstem system study.

Page 256: Under Long-term, unavoidable adverse impacts, the DEIS lists permanent loss of 5 acres of riparian forest. We recommend that this impact not be considered unavoidable unless it has been demonstrated that there are no other feasible alternatives for providing an adequate downstream approach.

Page 268: 8.1 Avoidance: In the last paragraph of this section, Greenup L&D should be added to the Myers project.

Page 269: Table 8-1 lists mooring facilities as a minimization measure to avoid damage to shoreline habitats during construction-related queuing. We recommend that permanent mooring facilities be included either as an environmental design feature or as a minimization measure to avoid/minimize impacts to shoreline habitat as well as to mussel and fish resources from barge queuing downstream from both Myers and Greenup during construction, during future lock closures and during normal operation.

Page 268-271: Environmental Commitments: As outlined above, we recommend that the Corps commit to additional modeling that would estimate potential impacts to aquatic resources from changes in tow approach/departure alignments and flow/scouring characteristics downstream from the lock for J.T. Myers and Greenup projects both during and post-construction. If modeling indicates that there may be adverse impacts to fish and wildlife resources, measures should be identified that would avoid or minimize the impacts and mitigation identified for any unavoidable impacts. Further, monitoring should be conducted during construction and for a short period after construction to ensure that the potential for adverse impacts are adequately addressed.

Page 272: Table 9-1, Regulatory Compliance and Permit Requirements: The DEIS states that the Endangered Species Act (ESA) prohibits harming any federally listed species. This statement should be modified to reflect that the ESA prohibits jeopardizing the continued existence of a listed species and also prohibits take, which includes "harm" of a listed species without authorization from the FWS.

Page 280: Table 10-2 the DEIS incorrectly lists Steve Jose and Tom Flatt as affiliated with the Illinois Department of Natural Resources (DNR). Both are employees of the Indiana DNR.

Appendix C

Page C-5: 3.1.4, Habitat: Appendix C states that Indiana bat males roost in upland forests with foraging occurring in upland forests, old fields and pastures with scattered trees, while summer foraging by females is limited to riparian and floodplain areas. This language is somewhat misleading in that both sexes regularly forage in floodplain, riparian and upland forest, and may also use old fields and pastures with scattered trees. Females generally have a smaller foraging range than males, and the type of habitat used for foraging may reflect availability.

Page C-11: 3.3.6, Status: Paragraph 1 states that "...[the fat pocketbook mussel] only comprises approximately one percent of the total mussel population." This statement is confusing because it does not define the "total mussel population."

Page C-12: 4.1.1, Indiana bat: Appendix C states that no preferred Indiana bat habitat would be impacted during the construction of the project. This is incorrect, as the forested downstream river bank proposed for shaving contains potential Indiana bat roosting and foraging habitat.

Page C-12, Fat pocketbook mussel (presumably this section should be numbered 4.1.3). Appendix C refers to areas downstream of the construction zone which contain "...possible *P. capax* favorable habitat. The wording should be modified to state that there are current records of the fat pocketbook (*P. capax*) in this downstream area in the Ohio River near Wabash Island.

Pages 212-214; 4.2.1, 4.3.1, 4.4.1, and 5.0, Indiana bat. Reference comments regarding pages 219/220.

5.0 Summary and Conclusions: Reference comments regarding Page C-12, 4.1.1.

Appendix G

Page 14; 5.0: Appendix G addresses mitigation for permanent loss of riparian forest. It should also include mitigation for temporary loss of riparian forest and for loss of shrubby and prairie habitat at Disposal Site 1. Page G-19 refers to restoring the latter two areas, but this should also be considered a type of mitigation.

Page 19: The tree-planting list includes some obligate wetland species (e.g. swamp white oak, water hickory). It should be verified that these species will survive on several feet of fill material.

Environmental Impact Assessment

Page 18. Section 4.2.1.1 should address potential indirect impacts from spoil disposal on the hydrology of the Little Pitcher wetland complex.

Page 19: Section 4.2.1.2 concludes that Alternative 2B would have no adverse impacts on wetlands because the dredged material/fill would be converted to moist soil units. The document should describe the analysis undertaken to reach this conclusion, particularly with regard to any analysis of wetland values and functions.

We appreciate the opportunity to review and provide comments on the draft feasibility report and the DEIS. Please contact Ms. Debbie Mignogno, Ohio River Project Coordinator stationed in the Fish and Wildlife Service's Tennessee/Kentucky Field Office (446 Neal Street, Cookeville, Tennessee 38501; telephone-931/528-6481x209; fax-931/528-7075; debbie_mignogno@fws.gov) if you would like to discuss further the Service's comments on the subject documents. Ms. Mignogno is the Service's Point-of-Contact for the Ohio River Mainstem studies.

Sincerely,

James H. Lee

James H. Lee
Regional Environmental Officer

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
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May 5, 2000

Civil Project Management Branch

United States Department of the Interior
Office of the Secretary
Office of Environmental Policy and Compliance
James H. Lee
Regional Environmental Officer
Richard B. Russell Federal Building
75 Spring Street, S.W.
Atlanta, Georgia 30303

Dear Mr. Lee:

This is in response to your 18 February 2000 letter providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR; DRAFT Main Report and DRAFT Environmental Impact Statement.

1. General Comments

The Greenup and J.T. Myers reports are interim reports identified during the ORMSS. The need for accelerating these two projects was due to the high costs associated with delays during closure of main chambers at the projects. Recommendation of these projects for authorization at this time does not affect decisions on the need for or justification of any future major navigation projects on the mainstem Ohio River. Neither do these two projects depend on any other potential major navigation improvements along the mainstem for their justification. Their economic and navigation benefits are unique to the structural and reliability of each project. Further, a large proportion of their continuent traffic is of a local nature. Each is individually justified on its own benefits and is independent of other possible future major navigation improvements in terms of their utility and benefits. The environmental impacts of these projects have also been found to be largely local. The extent and influence of limited site-specific impacts associated with the proposed enhancements make consideration of these projects reasonable in their own context. Section IV of the FEIS addresses cumulative impacts of proposed actions at the J.T. Myers and Greenup Locks and Dams.

The Corps of Engineers understands that the Ohio River supports a continuum of resources along its length. We also agree with the importance of addressing system-wide cumulative impacts which could result from the combination of all major navigation improvements. This will certainly become an issue of great concern as we explore options which may impact system-wide resources during the course of the ORMSS. Therefore, we are committed to performing an assessment of system-wide cumulative effects on resources along the river corridor in the next report dealing with major navigation improvements on the mainstem. We are currently revising the study plan with emphasis on completing the Master Plan in the next report on major navigation improvements under the ORMSS. It appears likely, at this time, that the document will include both a Master Plan and feasibility level authorization reports. Regardless of the direction of the next report, as agreed upon with the USFWS (see attached Memorandum for Record of a 12 January meeting between the Corps and USFWS), the Corps of Engineers will include appropriate studies to assess past, present, and reasonably foreseeable future actions by the Corps of Engineers and others. Although no additional cumulative impacts for J.T. Myers and Greenup are anticipated to result from the system-wide assessment, during these studies we will:

1) Conduct an assessment of system-wide cumulative impacts to fish and wildlife (as well as other resources) of past, present, and reasonably foreseeable impacts of Corps of Engineers actions, as well as actions by others,
2) Conduct studies analyzing navigation-related impacts on fish passage, winter habitat use by fish, island erosion, and effects of navigation on fish and mussels, and
3) Agree that any necessary adjustments/modifications to proposed navigation improvements at Greenup and J.T. Myers identified through the system-wide cumulative impacts assessment will be pursued prior to making any irreversible/irretrievable commitment of resources that would foreclose consideration of less environmentally damaging alternatives. Specifically, the Corps will make every reasonable effort to implement modifications within current authorities and will seek additional authority, if needed, to implement other necessary modifications.

The economic models used in the current study do not project traffic increases as a result of the proposed navigation improvements. Although the justification for lock extensions is based primarily upon reducing delays during main chamber closures, having two 1200' chambers will also reduce delays during normal operations. These benefits are included in our analysis. Our analyses still do not reveal project-related increases in traffic on the river. See Sections 12 and 15 (particularly Tables 12-1 and 15-1) of the Main Report for information on economic analyses.

The Corps of Engineers has worked closely throughout this study with natural resource interests in the US Fish and Wildlife Service and the six states along the Ohio River mainstem. Through these efforts, many ideas for protecting and/or improving conditions for natural resources have been incorporated into the proposed projects. The mitigation plans for the two projects are included in Appendices F and G of the FEIS. As suggested in your comments, mooring facilities have been included in project plans at the Greenup Locks and Dam to minimize impacts from tow queuing during construction. If mooring facilities are determined by the Corps to be needed at various locations throughout the length of the river, as suggested in your comments, the Corps will continue to work with the Service and US Coast Guard, as well as the navigation industry to identify and correct such conditions.

As stated above, the Corps of Engineers will conduct studies related to fish passage as part of the system-wide cumulative impacts assessment in the next report on major navigation improvements. Should that study determine Greenup or J.T. Myers Locks and Dams are obstructing fish movements, the Corps will work with the Service and the States to modify designs and/or operations to enhance desirable fish movements. This commitment is contained in Section 8.4 of the FEIS.

2. DRAFT FEASIBILITY REPORT

Specific Comments

Page 10-6: See Response 1.

Page 12-1&2; Tables 12-1 and 12-2: See Section 8 of the Main Report for additional information on traffic projections.

Page 12-6; Ohio River System Environmental Impacts: Our analyses do not indicate a synergistic effect of improvements at J.T. Myers and Greenup Locks and Dams on traffic. Cumulative impacts of these two proposed projects are discussed in Section IV of the FEIS. System-wide cumulative impacts will be addressed in the next report on major navigation improvements as discussed above.

Page 12-12/15: The 20 acres proposed for riparian forest mitigation for the bank shaving is included as an additional Mitigation Measure. (see Sections 5 and 6 of Appendix G of the FEIS)

Page 13-7; Figure 13-1: We do not anticipate higher traffic demands anywhere in the system as a result of the extension. Looking at Figures 10-1 and 13-1 in the Main Report you can see the difference between projected traffic demands (which are the same in the With-and the Without-Project condition) and traffic

accommodated in the Without-condition. Traffic diverted from the system is noticeable only during closures. That is to say, Greenup and Myers have sufficient capacity to handle demands, excepting during closures. This is especially true for Myers. At Greenup, its ability is starting to be challenged around 2050.

Page 15-4; Endangered Species: The Main Report has been changed to reflect that the reference was to Federally listed endangered species.

Page 15-5; Ohio River System Environmental Impacts: Our analyses do not indicate a synergistic effect of improvements at J.T. Myers and Greenup Locks and Dams on traffic. Cumulative impacts of these two proposed projects are discussed in Section IV of the FEIS. System-wide cumulative impacts will be addressed in the next report on major navigation improvements as discussed above.

Draft Environmental Reference Data

Our preliminary assessment concluded that changes in flow patterns and velocities during construction and operation of the proposed extended chambers would be extremely minor and not alter current sedimentation or scour patterns. Two physical models will be built to better assess this at both projects. The scope of this first model is primarily to develop the design of the fill/empty system, and measure flow patterns and velocities within the immediate lock area. The second model will fully evaluate the hydraulic performance of both projects. The data obtained from the two models should definitively determine any changes between the existing condition and the recommended plan. We encourage the resource agencies to provide a representative to be a member of our Physical Navigation Model Team and participate in these studies.

Section 3.2.4.1.3: Threatened, Endangered and Other Protected Species: Table 3-18 of the FEIS correctly indicates that the ring pink (mussel) is federally listed.

DRAFT ENVIRONMENTAL IMPACT STATEMENT

General Comments

Section 4.0: The Corps of Engineers concurs in the need for a baseline against which to compare predictions of effects of proposed actions and the No Action condition. Section 4 of the FEIS includes these baseline conditions of the resource. The outputs of economic analyses suggest that future with and without project conditions are essentially the same from the standpoint of traffic growth, fleet configurations, and facilities. As such, the Corps has stepped through the process as outlined by CEQ and EPA and determined that exhaustive cumulative impact assessments for Ohio River resources was not appropriate for decisions on the two proposed projects at this time. We are committed, however, to conduct a system-wide assessment of cumulative impacts in the next report on major navigation improvements as discussed above. This will likely include a more detailed description of baseline conditions for potentially affected resources.

Because traffic levels, fleet configurations, barge facilities, approach patterns, flow patterns, and maintenance dredging are expected to be essentially the same under the with and without project conditions, no secondary or indirect effects are expected. Refer to the response on the Draft Environmental Reference Data above regarding approach and flow patterns.

Specific Comments

Page ii; Major Conclusions: Adverse impacts to soils, water quality, etc., under the No Action alternative are briefly mentioned in the FEIS.

Page 33; Bank Protection: Disturbed banks will be restored using bioengineered and/or other appropriate bank stabilization techniques similar to those described in Appendix F of the FEIS. The exact practices will not be determined until more detailed design has been completed. However, habitat values per acre prescribed in Appendix F of the FEIS are feasible and will be preserved in the final design. Should

additional bank clearing and restoration be required, based upon model results, bank stabilization practices would attain habitat values per acre described in Appendix F for impacted areas.

Page 76; 2.2.3.5.1.: The Corps will explore use of more appropriate riparian species that could be planted on this restored area. We also agree that Disposal Site 1A contains compacted fill material that is not "topsoil". We would propose to add organic material to the surface layer of the restored site, use low ground pressure equipment to limit compaction, and import topsoil, if necessary.

Page 76; 2.2.3.5.2.: The preferred alternative for the project has been identified in the FEIS as Disposal Site 1A.

Page 82; 2.2.3.5.5. The preferred disposal alternative for the project has been identified in the FEIS as Disposal Site 1A.

Page 84; Table 2-8, Biological Resources: The preferred alternative for the project has been identified in the FEIS as Disposal Site 1A.

Page 103; 3.2 Greenup, 3.2.1 Environmental Conditions: The FEIS (Section 3.2.1) has been modified. Seven native mussel individuals were found in the 0.5 mile zone upstream of the dam during surveys in August of 1999 (see Appendix B of the FEIS). "Mussel bed" in the text of the DEIS was intended to suggest communities or groups of native mussels occupying a defined habitat area. Also, the following paragraph and Table 3-18 of the FEIS have been changed to reflect the correct name for the purple catspaw pearly mussel.

Page 116; 3.2.3.2.2 No Action: The text of the FEIS and Table 3-12 has been modified to reflect that the impacts to water quality from towboats in queue is significant.

Page 123; 3.2.5.1.2.2 Wildlife: Section 2.1.1 of the FEIS provides detailed information regarding the location of the Greenup Locks and Dam.

Page 129; 3.2.5.2 Environmental Consequences: For consistency throughout the document, the lists of potential impacts at the beginning of each "Environmental Consequences" section contains possible impacts of both the action and no action alternatives. Table 3-20 provides additional clarification.

Page 130: The Corps will work with USDA Animal Damage Control to develop site-specific strategy to discourage migratory bird nesting. This commitment is reflected in the FEIS (Section 8.1).

Turbidity will be monitored during construction and will be included in the project plan (see Section 8.4 of the FEIS). We cannot commit to limiting in-river construction activity to the winter months. Doing so would increase local aquatic and terrestrial impacts and increase the cost of the project. Limiting in-river work to winter months would quadruple the construction period for the project, delay recovery of local aquatic and terrestrial resources, and postpone implementation of on-site mitigation.

Pages 132 and 216: Traffic projections between the With and Without Project condition would cause a decrease in habitat values for paddlefish, sauger, freshwater drum and emerald shiner. Because these impacts are localized and extremely rare, the impacts would be adverse, but mitigated. Table 3-20 in Section 3.2.5.3 has been revised to include these impacts. The mitigation detailed in Appendix G will offset the expected declines in habitat values.

Page 133; Table 3-20 Summary of Greenup: Table 3-20 has been corrected in the FEIS to reflect that turbidity and/or release of contaminants would have adverse but insignificant impacts on aquatic biota under the 600-ft Auxiliary Lock Extension alternative. As discussed in Section 3.2.5.2.1, a turbidity curtain would be used to reduce adverse effects on aquatic organisms downstream of construction activities.

Page 186/187; 3.3.3.2.2: The discrepancy between this section and the description on page 76 of the DEIS has been corrected in the FEIS. The maximum surface elevation increase at Disposal site 1 would be 7

feet. Any effects on the floodplain should be minimal at J.T. Myers because the floodplain size at the project site is over a mile wide for the 100-year event. Additionally, the disposed material is to be placed to a final elevation lower than the top of the existing access road to the site. In fact, a 1995 letter from the Indiana Department of Natural Resources state that "...Given the small amount of fill resulting from this project and the large floodplain area available during the 100-year flood, it is the Department's position that a hydraulic model will not be required..." Also, all work is taking place on the Indiana bank and there will be no changes to the Kentucky side of the project relative to the excavated material.

Page 188, Table 3-38, Summary of Impacts: Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging activities. This previous testing has not revealed significant contamination in the sediments. However, the Corps of Engineers proposes to implement a thorough chemical-testing program during the summer of 2000 or 2001. The Indiana Department of Environmental Management (IDEM) is currently reviewing the work plan that describes the proposed testing. The text in Section 3.3.3.2.1 of the FEIS has been revised to reflect this information.

Disposal Sites 2A and 2B have been identified as farmed wetlands in Sections 3.3.5.2.3 and 3.3.5.2.4. Disposal Alternative 1A has been identified in the FEIS as the preferred disposal alternative.

Page 192; 3.3.5.1.1: We believe the existing text in Section 3.3.5.1.1 is adequate for the decision affecting wildlife.

Page 201; 3.3.5.1.2: This section of the FEIS includes a discussion of fish habitat in this portion of the Ohio River.

Page 205; 3.3.5.1.3: This section of the FEIS has been revised to reflect the recent record of the harlequin darter (*Etheostoma histrio*) from the Ohio River near the mouth of the Wabash River.

Page 209/210; 3.3.5.1.6, Navigation Pools: Section 3.3.5.1.2 now contains a reference to navigation pools, which contain further information on aquatic habitat.

Page 213; 3.3.5.2.1: The FEIS reflects that potential bald eagle perching habitat occurs along the forested shoreline proposed for tree-clearing and excavation.

Page 214: We have agreed to mitigate for this loss at a 4:1 ratio (see Appendix G, Section 5). This information is included in the FEIS.

Page 215: A detailed analysis of queueing downstream of Myers L&D, during the construction period, was conducted by the Economics team using discrete-event simulation modeling of the traffic (using the Waterways Analysis Model). The model was used to forecast expected queues for the construction of the lock extension in 2006 and 2007--and assuming traffic levels forecasted for these same years.

As shown in Figure 1.5A of the report's Document ED-1 (the J.T.Myers Engineering Site Appendix), seven closures of the Main (1200' long chamber) are expected during construction of the extension. Most of these closures will be short (not to exceed 3 days apiece). The most significant queues occur during one closure in 2006 and two closures in 2007 when both the Main and the shorter Auxiliary chambers need to be closed at the same time--i.e., all traffic is stopped for 2-3 days during each of these three events. During each of these three events, the WAM model indicated that traffic queues could grow to as many as 43 vessels waiting in line in each direction (both upstream and downstream of Myers). Traffic demand (vessels approaching Myers) during normal operation of the lock would be about 24 vessels per day. The WAM analysis indicated that the queue may take 5-7 days to dissipate following re-opening of the Main chamber (after each of the 3-day simultaneous closures).

This analysis did not forecast the possible effects of notice and traffic rescheduling by towing companies to avoid this stretch of river during the simultaneous closure events. Although every attempt will be made to issue ***Notices to Navigation Interests*** in the year and weeks prior to the specific future closures, it is

unlikely that all traffic will be able to avoid getting snarled in the congestion caused by the closures. It is difficult for the interstate waterway freight carriers to work around such an event precisely -- especially given variables caused by weather and construction progress which would make the EXACT times of the closures somewhat variable. However, 20 or more vessels can be expected to queue in each direction, given past experience with pre-announced closures.

In general, between 20 and 40 vessels can be expected to line up during each of these 3 simultaneous closure events between J.T. Myers Lock and the Shawneetown Bridge. The Final EIS has been modified in Section 3.3.5.2.1 to include the queue information discussed in the preceding two paragraphs.

Furthermore, the Corps will, during Preconstruction Engineering and Design (PED) studies, conduct a mussel survey of the area between Milepoints 847.8 and 849.2 (one mile downstream of the mouth of the Wabash River), in order to precisely locate potential mussel bed(s), specifically *Potamilus capax*. If significant mussel resources are located, navigation charts will be modified to reflect these areas, and the Corps of Engineers will work with the Coast Guard and the towing industry to avoid queueing impacts to the mussel resources. During construction of the lock extension, one or more ***Notice(s) to Navigation Interests*** will be issued, in consultation with the US Coast Guard and the appropriate US Fish and Wildlife Service Field Office, providing:

- The expected forecast of closure dates for each chamber to alert the towing industry and to reduce traffic during these periods.
- Identified mussel communities would be delineated and marked prior to construction. Guidance would be given to vessels to avoid "nosing-in" to the bank and idling propellers in any marked areas.
- US Coast Guard and/or US Army Corps jurisdictions would govern appropriate enforcement mechanisms.

Although detailed analyses of blasting impacts on fish have not been conducted, general measures to reduce potential mortality are described in the FEIS. The Corps of Engineers will require a detailed blasting plan to be developed that will include measures to avoid or reduce impacts, monitoring of fish mortality, and mitigative measures if needed.

As stated in Section 3.3.5.2.1 of the FEIS, additional hydraulic studies would be performed prior to construction. These modeling efforts will determine if there may be changes such as approach/departure alignments and flow/scouring/sedimentation characteristics downstream of J.T. Myers and Greenup. As stated above, we encourage the resource agencies to provide a representative to be a member of our Physical Navigation Model Team and participate in these studies.

Page 217; 3.3.5.2.2: The Uniontown, KY-IN quad sheet shows that all drainage enters Little Pitcher Lake from the north or the east. The area to the south (the disposal area) is very flat and the ground slopes to the lake only from the small wooded area immediately adjacent to the stream. The disposal area should have no hydrologic impact on Little Pitcher Lake. However, Disposal Site 1A would have an impact by reducing the amount of backwater flooding from the Ohio River. This would mean less flooding to this site, which should be beneficial to the re-established prairie community. In addition, placement of material should not impact adjacent wetlands, as no wetlands are present in the disposal area, and all spoil material will be contained so runoff will not enter Little Pitcher Lake or adjacent wetlands. Tree clearing will occur during the winter months to avoid the occupancy period for Indiana bats.

Page 218/219: The FEIS has been corrected to reflect that Disposal Alternatives 2A, 2B, 3A, and 3B are not foraging habitat for Indiana and evening bats. Please note, however, that Disposal Alternative 1A is the recommended plan in the FEIS.

Page 220; Table 3-45, Summary of Impacts: See response to Page 188 above.

Page 249-253: See response to general comment 1 above regarding system-wide cumulative impacts.

Page 256: Given the current level of design for this project, the permanent loss of 5 acres is unavoidable.

Page 268: 8.1 Avoidance: The Corps of Engineers recognizes that impacts to nesting bats are undesirable in light of the status of the species and its habitats. However, there are other environmental costs associated with instituting a cutting moratorium during the late spring and summer. As such, the Corps analyzed the potentially impacted habitats in an effort to apply the Service's established approach to Indiana bat protection wisely for this federal project.

The Corps considered that the Indiana bat migrates in summer to forested bottomlands, uplands and riparian habitats in search of maternal roosting sites and bachelor roosts. These are normally found in exfoliating bark, tree cavities, under cover of certain climbing vegetation or in caves. Colonies can form with numerous reproductive females utilizing spatially proximal nesting sites. The key for the Greenup site is the suitability of the vegetative community for maternal colonies or roosting individuals. This wooded riparian community is approximately 15-20 years old with a canopy height of 30 ft. A mix of pioneer tree species dominates the canopy. Only silver maple and dead cottonwoods appeared to offer the potential for roost sites. Silver maple individuals were found to be underdeveloped and not expected to produce canopy closure or exfoliating bark ideal for roosting for at least another 5-10 years. The uncommon dead-standing cottonwood specimens may offer sites before that time, but were too rare to justify concern.

In spite of the poor quality of habitat, the Corps commissioned a summer survey for bat use at and near the project. Two "highest potential" sites were located on Corps property and two sites were selected nearby to establish bat use in the area. The findings of these surveys support the supposition that habitats affected by the project are poor for bat use. No individuals were found during surveys on Corps property. One big brown bat (*Eptesicus fuscus*) individual was trapped at a mist net location approximately ½ mile north of the project at the mouth of Gray's Branch.

The Corps shares, with the Service, responsibility for the protection of federally endangered species and for the protection of habitats on the Greenup site. These habitats may be unnecessarily impacted by an inflexible vegetation management approach. Therefore, the Corps intends to remain flexible with regard to the clearing of vegetation. The Corps invites the Service to remain active in the development process as detailed designs are developed and contracted. Site-specific concerns for the Indiana bat are appropriately raised at anytime and will be considered against the current body of data available for the site. Further, should construction be delayed more than 5 years, presenting a likelihood of developing habitats, the Corps would revisit the analysis to ensure protection of the Indiana bat.

Page 269: See the response above to comment 4.aa Section 3.3.5.2, page 215 of the DEIS. That response provides for certain measures to reduce problems associated with queuing downstream of the J.T Myers site during construction.

Page 268-271: As stated above, the Corps of Engineers is committed to physical modeling to address concerns raised in your comment letter, and we invite your participation on our modeling team. Also, we are committed to monitoring of impacts during construction and for a short time period after construction as stated in FEIS Section 8.4. Detailed monitoring plans will be developed during the PED phase.

Page 272: Table 9-1 Regulatory Compliance and Permit Requirements: The statement in this table has been modified as suggested.

Page 280: Table 10-2 has been corrected.

Appendix C: Changes have been made to indicate that both sexes of Indiana Bats regularly forage in floodplain, riparian, and upland forest.

Page C-11, 3.3.6, Status: The FEIS has been modified to clarify the definition of "total mussel population."

Page C-12, 4.1.1: Bank shaving has been revised to indicate removal of potential Indiana Bat roosting and foraging habitat.

Page C-12: Based on current records, the Corps will be conducting another mussel survey on the Ohio River from milepoint 847.8 to 849.2. This survey will examine the area of the mouth of the Wabash River for *P. capax* and other species.

Pages 212-214, 4.2.1, 4.3.1, 4.4.1 and 5.0: See response to page 219 and 220 comment.

Pages 5.0 Summary and Conclusion: Section 5.0 has been changed to reflect that the area proposed for bank shaving potentially contains Indiana bat roosting and foraging habitat.

Appendix G

Page 14: The 20 acres proposed for riparian forest mitigation for the bank shaving has been included as an additional Mitigation Measure. Restoration of the disposal site prairie is considered an environmental design feature and is not considered mitigation.

Page 19: Better species are available for planting on this elevated area. The area will not be a bottomland hardwood wetland, so obligate species will not be necessary. More appropriate riparian species will be substituted. In addition, measures will be taken to resolve any compaction problem on the constructed area, and suitable topsoil will be imported, or organic material will be incorporated in the existing soil.

Environmental Impact Assessment

Page 18: Refer to Section 3.3.5.2.2 of the FEIS.

Page 19: Refer to Section 3.3.5.2.2 of the FEIS.

We appreciate your interest and participation in our studies of navigation improvements at the J.T. Myers and Greenup Locks and Dams. We look forward to your continued involvement as these projects continue into more detailed design phases, as well as in all other components of the ORMSS.

Sincerely,

Veronica Rife

Veronica L. Rife, P.E.
Project Manager

JAMES E. BICKFORD
Secretary

PAUL E. PATTON
Governor

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

MEMORANDUM

TO: Alex Barber
State Environmental Review Officer
Department for Environmental Protection

FROM: Timothy Kuryla TK
EIS Coordinator
Division of Water

DATE: February 10, 2000

SUBJECT: DMR & DEIS, Ohio River Myers & Greenup Lock Improvements (Union & Greenup Counties), SERO 000111-04

The Division of Water has reviewed the Draft Main Report and Draft Environmental Impact Statement prepared by United States Army Corps of Engineers, Louisville and Huntington District Offices, regarding lock and dam improvements at J. T. Myers (Uniontown) and Greenup Locks and Dams. These locks and dams are located respectively at Ohio River, River Miles (RMs) 135.5 and 640.4 (as measured from the confluence). The Kentucky portions are located respectively in Union and Greenup Counties. The Division's comments discuss water quality and floodplain construction matters that need to be addressed in the Final MR and Final EIS.

WATER QUALITY

If the project will result in the discharge of dredge or fill material into:

- 200 linear feet of any "blue line" stream (as shown on the U.S. Geological Survey 7.5 minute topographical map for the project area), or
- One acre or more of any wetland,

a 33 USC § 1341 ("401") water quality certification by the Division of Water for the U.S. Army Corps of Engineers and a 33 USC § 1344 ("404") dredge or fill permit must be obtained. The DMR & DEIS are not clear as to whether or not these need to be obtained. The FMR & FEIS need to address water quality certification, and dredge and fill permits.

EDUCATION PAYS

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SERO 000111-04
Page 2

FLOODPLAIN CONSTRUCTION

EVALUATION OF FINAL PLANS (MYERS)
Environmental Impacts
Terrestrial **DMR Page 12-4**
EVALUATION OF FINAL PLANS (GREENUP)
Environmental Impacts
Aquatic & Terrestrial **DMR Pages 15-3 and 15-4**

The terrestrial impacts of both projects need to be specific, especially with regard to the affect on floodplains. The Myers project had very little and the Greenup project had no discussion with regard to these matters. The FMR & FEIS need to address floodplain impacts.

c: William Sampson, Water Quality Branch
Leon Smothers, Water Resources Branch

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Timothy Kuryla
EIS Coordinator
Division of Water
Natural Resources and Environmental Protection Cabinet
Department for Environmental Protection
Frankfort Office Park
14 Reilly Road
Frankfort, Kentucky 40601

Dear Mr. Kuryla:

This is in response to your 10 February 2000 Memorandum to Mr. Alex Barber providing comments on the "Interim Feasibility Report/ J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

The Corps of Engineers is pursuing authorization for the J.T. Myers and Greenup Lock Improvements under Section 404(r) of the Clean Water Act Section 404 (r) allows Congressional authorization of a water resources project with or without specific certification under Section 401 of the Clean Water Act that the project will not violate state water quality standards. It does not, however, exempt the project from the need to comply with state standards. Under our regulations, if the Corps of Engineers intends to pursue authorization of a project under Section 404(r), we must make that intention clear in a DEIS that is circulated for comment. We must also include an evaluation similar to that normally provided under Section 404(b)(1). What the Corps normally provides in a Section 404(b)(1) is outlined in established Corps regulations. These two steps were taken in the DEIS. Our regulations also provide the opportunity to request Section 401 certification from the appropriate state agency while still preserving Congress' option for authorization under Section 404(r). The Corps of Engineers is in the process of requesting Section 401 certification from the State of Indiana for the J.T. Myers project and from the Commonwealth of Kentucky for the Greenup project. This provides each state the opportunity to establish those conditions, through the certification process, they believe necessary to ensure the projects do not violate state water quality standards. Through these actions, along with the circulation of the DEIS for comment, we do not believe we have precluded your opportunity to express your concerns or to work with us to ensure the projects do not violate individual state water quality standards. Although the Corps of Engineers does not issue itself an actual 404 permit, we are required to comply with all the procedural provisions of the permitting process and associated regulations. We value the ideas and inputs of all our environmental partners involved with the Ohio River Mainstem System Study and strongly desire to keep the partnership a viable and productive ingredient in the study. The Executive Summary, Section 3.2.3.2 - Greenup Water resources, and Section 3.3.3.2 - Myers Water Resources of the FEIS have been modified to clarify the 404(r) authorization option.

Any effects on the floodplain should be minimal at J.T. Myers because the floodplain site at the project site is over a mile wide for the 100-year event. Additionally, the disposed material is to be placed to a final elevation lower than the top of the existing access road to the site. In fact, a 1995 letter from the Indiana Department of Natural Resources stated that "'...Given the small amount of fill resulting from this project and the large floodplain area available during the 100-year flood, it is the Department's position that a hydraulic model will not be required..." Also, all work is taking place on the Indiana bank and there will

be no changes to the Kentucky side of the project relative to the excavated material. These impacts are discussed in the FEIS Section 3.3.3.2.1 - Myers Water Resources.

In the vicinity of the Greenup project the floodway is limited to the top of the river banks. Therefore, no fill will occur in the floodway. However, the disposal site is in the floodplain. A potential analysis under Executive Order 11988 will be performed during the Preconstruction Engineering Design phase of our study. Due to the width of the floodplain, we are not anticipating any adverse impacts. This information is discussed in the FEIS Section 3.2.3.2.1.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica Rife

Veronica L. Rife, P.E.
Project Manager

Copy Furnished:
Mr. Alex Barber
State Environmental Review Officer
Department for Environmental Protection
Frankfort Office Park
14 Reilly Road
Frankfort, Kentucky 40601

From: Povolny, Don [mailto:Don.Povolny@dnr.state.oh.us]
Sent: Tuesday, February 08, 2000 11:00 AM
To: 'Rife, Veronica'
Cc: Fagan, Pat; Hopewell, Jim; 'Sams, Brenda'; 'Cates, Rich'; Bartz, Dick; Becky Jenkins; Bob Fletcher; Capuzzi, Kelly; Davis, Duane; Guy, Don; John Marshall; Kevin Elder; Lammers,Kenneth; Malone, Steve; Merchant, Linda; Multerer,Kenneth; Pat Fagan; Pat Jones; Smith, Mike; Tim Shearer

Subject: LCOE Greenup Locks Improvement Project

(Scioto County)

The Ohio Department of Natural Resources (ODNR) has completed a review of the above referenced project proposal. These comments were generated by an inter-disciplinary review in consultation with the Division of Wildlife and other divisions within the Department. These comments have been prepared under the authority of the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.), the National Environmental Policy Act and other applicable laws and regulations.

Natural Heritage maps and files for the proposed project were reviewed for records involving endangered, threatened or special interest species in the immediate project vicinity. The Natural Heritage Data Base lists six rare fish species collected downstream from the Greenup Dam along the Ohio side of the river:

Hiodon alosoides - Goldeye, state endangered
Hiodon tergisus - Mooneye, special interest
Esox masquinongy - Muskellunge, special interest
Ichthyomyzon unicuspis - Silver Lamprey, no status
Lepisosteus platostomus - Shortnose Gar, state endangered
Moxostoma carinatum - River Redhorse, special interest

As part of the Impact Statement, the Army Corps contracted for a mussel survey on the Ohio side of the river from mile 340.5 to 343.0. A young, but diverse mussel bed is located in this area. The bed contains a total of 16 species represented by live animals, and 4 of these species are listed as state endangered.

The applicant must provide a mitigation plan for all impacts resulting from the proposed project. The ODNR/Division of Wildlife is working closely with the Corps of Engineers in the development of mitigation plans. We would like to continue to submit comments on the Ohio River Mainstem Systems Study as a result of meetings under that forum.

We are concerned with what impact increasing the size of the 600 foot chamber to 1,200 feet would have on recreational boating traffic, regarding delays in lock time. If both chambers are suited to locking through full size tows, recreational boats may see additional delays as they are at the bottom of the priority lockage list.

We would like to know if this was addressed in the study. There were 591 lockages of 1,452 recreational vessels for the period 1/99 through 12/99. While this is a small amount compared to total tow traffic, it is seasonal in nature, and occurs over a shorter period of months. This results in a higher comparative volume during the summer. We appreciate the opportunity to provide these comments. If you have any questions, please contact me.

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Ohio Department of Natural Resources
Division of Real Estate and Land Management
ATTN: Don Povolny
Bldg. C-4
Fountain Square
Columbus, Ohio 43224

Dear Mr. Povolny:

This is in response to your 8 February 2000 email letter providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR:, DRAFT Main Report and DRAFT Environmental Impact Statement.

We appreciate your agency's contribution to this planning process. Of particular value is the State Natural Heritage database in identifying sensitive species and communities. The information provided in your letter with respect to State threatened and endangered fishes is included in the Draft and Final Environmental Impact Statements (EIS).

Every attempt has been made to avoid impacts to terrestrial and aquatic resources. Mitigation plans have been developed for those resources unavoidably affected by the project. These plans have been formulated in consultation with State and federal resource agencies. The particulars of the plan are contained in Appendix F of the FEIS.

Recreational vessel access to an extended auxiliary chamber at the Greenup Lock & Dam is a concern that was not specifically addressed in the Draft EIS. We appreciate your attention to this issue. Normal operations of the Greenup Lock & Dam would not change with the extension of the auxiliary chamber. Access to main and auxiliary lock services would also remain unchanged. Current traffic projections do not suggest increased traffic as a result of the auxiliary lock extension or increased demand for auxiliary lock service by commercial navigators during normal operations.

However, as demand for lock services grow in the future, projections suggest that maintenance closures for the main lock chamber may produce significant queues of commercial vessels. These waiting commercial vessels would preempt recreational vessels as long as a given main chamber closure persists. An extended auxiliary chamber could accommodate the commercial vessels more efficiently, reducing, if not eliminating, the queues. This would produce a significant improvement in recreational vessel access to lock service during maintenance closures of the main chamber.

As suggested, in the No-Action scenario long queues would result from closures of the main chamber. Access to the auxiliary chamber would be limited for recreational vessels as commercial traffic is routed through the smaller auxiliary chamber for the duration of the closure.

The consideration of these impacts has been incorporated into the Final EIS Sections 3.2.15 and 3.3.15. Thank you for your attention to this issue and for comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica Rife

Veronica L. Rife, P.E.
Project Manager

Bob Taft • Governor

Samuel W. Speck • Director

Division of Wildlife

Michael J. Budzik • Chief

February 26, 2000

Ms. Veronica Rife
U. S. Army Corps of Engineers
P. O. Box 59 - ATTN: PM-C
Louisville, KY 40201

Dear Ms. Rife:

The Ohio Division of Wildlife has reviewed the Greenup Lock Improvements Draft Main Report and Draft EIS. The report has incorporated most of our comments from meetings, phone conversations, and on-site visits.

We favor aquatic mitigation plan C (EIS F-46) for on-site mitigation that includes 1.3 acres of protected shallows for biostabilization of impacted riverbank areas and two 1,000 foot tailwater dikes. We also favor the T-dikes and notched dikes proposed as mitigation for traffic effects in Greenup and Meldahl pools.

We are concerned that the placement of the new outlet culvert will degrade recreational use and cause the existing modified restricted zone to be reduced. We would like to work with the Corps to mitigate these losses. We request to be included early in the modeling process for final placement and design of the tailwater dikes to insure that maximum habitat gains and recreational benefits are fully considered.

We are also concerned that placement of the new 1100 foot land wall extension below the dam will negatively impact existing and future shoreline fishing. Figure: 2-2 (EIS-23) depicts the proposed land wall extension below the dam to be adjacent to the shoreline with little or no backwater area between the wall and the shoreline. We recommend that the downstream backchannel be opened and as much water as possible be left behind this wall to permit access for fish and fishermen.

The Corps should include the construction of an ADA compliant tailwater fishing pier and associated access on the Kentucky shore behind the land wall at its upstream end (near the dam). Such a facility would receive heavy use by anglers from both Ohio and Kentucky.

Thank you for the opportunity to review and provide comments on the draft feasibility report. Please contact Mr. Randy Miller, Assistant Fisheries Administrator, 1840 Belcher Drive, Building G, Columbus, Ohio 43224 if you would like to discuss our comments further.

Sincerely,

MICHAEL J. BUDZIK
Chief

MJB:ms

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Michael Budzik, Chief
Ohio Department of Natural Resources, Division of Wildlife
Building G
1840 Belcher Drive
Columbus, Ohio 43224

Dear Mr. Budzik:

This is in response to your letter dated February 28, 2000 providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR; DRAFT Main Report and DRAFT Environmental Impact Statement.

Your energetic participation has significantly contributed to a product that is environmentally and economically responsive to the public interest. As mentioned in your letter, we have collaboratively developed several mitigation options for environmental impacts that cannot be avoided during an extension of the auxiliary lock at Greenup Locks & Dam. The Corps of Engineers concurs with your suggestion that on-site floodplain, riparian and aquatic mitigation is appropriate for these unavoidable ecosystem impacts.

Impacts to recreational users at Greenup Lock & Dam continue to present planning challenges, however. We share your concern for potential fishing access in the tailwaters of the dam. The proposed outlet system would affect future access as new risks are introduced to the recently modified restricted zone. The extent of this impact will depend largely upon the final design of the outlet structure and the disposition of the tailwater dike mitigation features. We would appreciate your continued active involvement as we develop the features of the outlet system and mitigation plan. Hydraulic modeling will be conducted during the next design phase. I would expect your expertise and perspective to continue to prove a valuable asset in that process. We encourage your agency to provide a representative to be a member of our Physical Navigation Model Team and participate in these studies.

Recreational use along the Kentucky shoreline would also change with the proposed extension. Though water will be available behind the extended land wall some reduction in accessible fishing may be inevitable. The final disposition of the bank and land wall will not be known until a more detailed design is complete. However, we recognize the potential for lost recreational use. As mitigation, the Corps has recommended an upgrade of fisherman access along the Kentucky shoreline. Facilities and access would be improved while preserving the secluded values currently enjoyed along the Ohio River on the Kentucky shoreline. We also concur that an American Disabilities Act (ADA) compliant fishing pier is an important component of a recreational access improvement. Recent evaluations have suggested that this feature may be more appropriately located on the Ohio shore below the hydropower facility than below the lock extension along the Kentucky shore. The location of this feature would be established along with the particulars of the general improvements during the next design phase. We would appreciate the benefit of your continued involvement during that process.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

INDIANA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT
We make Indiana a cleaner, healthier place to live

Frank O'Bannon
Governor

Lori F. Kaplan
Commissioner

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March 15, 2000

Department Of The Army
U.S. Army Engineer District, Louisville
Corps Of Engineers
Post Office Box 59
Louisville, Kentucky 40201-0059

Dear:

RE: J.T. Myers and Greenup
Locks Improvements
Vanderburgh County, Indiana

The Indiana Department of Environmental Management (IDEM) has reviewed the above-noted project with consideration to potential effects on the environment at or about the project location.

The following topics were considered during our review process:

WATER AND BIOTIC QUALITY

The Office Of Water Management has submitted a letter under separate cover detailing potential issues and concerns related to water quality.

AIR QUALITY

The above project should be designed to minimize any impact on ambient air quality in or about the project area. The project must comply with all Indiana Air Pollution Control Board rules.

Consideration should be given to the following:

1. What disposal method is being used for organic debris from land clearing and other waste materials? Open burning is allowed for certain types of maintenance purposes with specific conditions. If burning is allowed by the rule and is being considered, evaluate the economic and technical feasibility of non-combustion disposal options, for example removal, mulching and burial. Open burning approvals may be granted for certain projects by OAM. Open Burning Rule 326 IAC 4-1 should be taken into consideration.

2. Reasonable precautions must be taken to minimize fugitive dust emissions from construction and demolition activities. Example precautions are wetting the area with water, constructing wind barriers, or treating the area with chemical stabilizers (such as calcium chloride or several other commercial products). Dirt tracked out from unpaved areas should be minimized. Please refer to Fugitive Dust Rule 326 IAC 6-4 for details. If construction or demolition is conducted in a wooded area where large blackbirds have roosted or abandoned buildings or building sections in which pigeons or bats have roosted for 3-5 years precautionary measures should be taken to avoid an outbreak of histoplasmosis. This disease is caused by the fungus Histoplasma capsulatum, which stems from bird or bat droppings that have accumulated in one area for 3-5 years. The spores from this fungus become airborne when the area is disturbed and can cause infections over an entire community downwind of the site. The area should be wetted down prior to cleanup or demolition of the project site. For more detailed information on histoplasmosis prevention and control, please contact the Acute Disease Control Division of the Indiana State Department of Health at (317) 233-7272.

3. Ensure that asphalt paving plants are permitted and operate properly. The use of cutback asphalt, or asphalt emulsion containing more than seven percent (7%) oil distillate, is prohibited during the months April through October. Please refer to 326 IAC 8-5 Asphalt Paving Rule for details.

4. If demolition or renovation of a structure will take place, asbestos and lead-based paint rules may apply. An inspection should be performed by an accredited asbestos inspector to determine if asbestos containing materials are present. If asbestos is present, rules governing project licensing will apply. Projects that involve lead-based paint activities should take the proper safety precautions to ensure the health of the buildings occupants and the safety of the environment. In projects that involve asbestos, notification rules and set schedules apply to renovation operations above a certain size and all demolition projects. The following rules may apply to either projects involving asbestos or lead-based paint:

   40 CFR 745 Lead: Requirements for Lead-Based Paint Activities in Target Housing and Child Occupied Facilities.
   326 IAC 14-2 Emissions Standard for Asbestos;
   326 IAC 14-10 Emissions Standard for Asbestos; Demolition and Renovation Operations, and
   326 IAC 18-1 and 18-3 Asbestos Personnel Accreditation Rules.

5. If this project is the construction of a new source of air emissions or the modification of an existing source of air emissions, it will need to be reviewed for an air emissions permit or registration according to 326 IAC 2-1 Permit Review Rules. Applications for permit review can be obtained by calling 317-232-8369.

OFFICE OF LAND QUALITY

1. The Office of Land Quality (OLQ) does not believe the site is or represents an environmental problem, based on the information provided. However, OLQ reserves the right to reassess the site if new or additional information becomes available.

2. If the site is found to contain any areas used to dispose of solid or hazardous waste, you shall contact the OLQ at 317-232-3210.

3. If any contaminated soils are discovered during this project, they may be subject to disposal as either special or hazardous waste. Please contact the OLQ at 317-232-4473 to obtain information on proper disposal procedures.

4. There may be PCB issues related to this site. Please contact the Special Waste Section of OLQ at 317-232-3111 for information regarding management of any PCB wastes from this site.

5. There may be asbestos issues related to this site. Please contact the Special Waste Section of OLQ at 317-232-3111 for information regarding management of any asbestos wastes from this site.

The Office of Land Quality is making file information pertaining to the Environmental Impact Statement Early Coordination program available to the public. These files are open to the public during regular business hours. The file room is located at 2525 N. Shadeland on the second floor.

If you need any additional information or have any questions, please contact the following person:

Ms. Anne Black 317-232-4524

FINAL REMARKS

We reserve the right for further review if the scope of the project, or any of its aspects, should change significantly from that which has been proposed, or we are made aware of factors which could have detrimental environmental effects.

Please note that this letter does not constitute a permit, license, endorsement or any other form of approval on the part of either the Indiana Department of Environmental Management or any other Indiana state agency.

Should you have any questions relating to our review, please contact the following program area people responsible for this review:

Water and Biotic Quality	
Andrew Pelloso	317-233-2481
Air Quality	317-233-0178
Kennye' Johnson	317-233-0430
Land Quality	
Debby Baker	317-232-0066
Review Coordinator	
Gary Starks	317-232-8795

Sincerely,

Len Ashack, Chief
Permits & Compliance Branch
Office of Water Management

Project No. 3322

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Len Ashack, Chief
Indiana Dept. of Environmental Management
Permits & Compliance Branch
Office of Water Management
100 North Senate Ave.
P.O. Box 6015
Indianapolis, IN 46206-6015

Dear Mr. Ashack:

This is in response to your letter dated March 15, 2000 providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR; DRAFT Main Report and DRAFT Environmental Impact Statement.

The best method of disposal of any land clearing operations necessary would be chipping of all material for future use as mulch on the prairie restoration site. Chipping and mulching will be used for any natural organic waste (trees, brush) occurring onsite. No burning at the site will be proposed.

Reasonable efforts will be taken to minimize dust emissions around all construction areas. Construction areas will be sprayed with water when fugitive dust begins to become a problem. According to Tre Barron, Project Assistant at J. T. Myers, there are no large blackbird roosts in the vicinity. The only bird problem that they have is with pigeons around the dam, but not in areas which will be impacted by construction. Should any histoplasmosis spores be present, this water spray should prevent spores from becoming airborne. (See Section 3.3.4.2.1 of the FEIS)

The construction contract specifications will require that any asphalt used on the project comply with state regulations and be provided by a state-approved asphalt plant.

No abandoned buildings will be removed as part of the proposed construction. The Phase I HTRW assessment for the J.T. Myers project did not indicate any potential problems with asbestos or lead based painted structures. In the event that the project will require disturbance of structures containing these substances, appropriate precautions and procedures will be followed.

Should the project result in a new source of air emissions or the modification of an existing source, the Corps will obtain the appropriate air permits. This requirement is contained in Section of the FEIS.

Should at any time during the construction of the J.T. Myers Locks Improvement project hazardous materials be detected, the appropriate state agency would be contacted.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

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February 15, 2000

Ms. Veronica Rife
US Army Corps of Engineers
CELRL-PM-C
PO Box 59
Louisville, KY 40201-0059

Dear Ms. Rife:

Re: JT Myers & Greenup Locks Improvements
IDEM Comments- Draft EIS

The Indiana Department of Environmental Management (IDEM), Office of Water Management staff have reviewed the DRAFT Environmental Impact Statement for the proposed improvements to the JT Myers and Greenup locks on the Ohio River. IDEM's comments are limited to the JT Myers facility located near Mount Vernon, Indiana. Please consider the following comments:

1. The EIS notes that the Corps plans to pursue an exemption from Section 404 and Section 401 permitting under Section 404(r) for congressionally authorized federal construction projects. IDEM strongly objects to this option. IDEM believes that a 404(r) exemption will undermine the cooperative efforts established by the Ohio River Mainstem Systems Study partnership which has been in existence since 1996.

   Further, IDEM believes that significant impacts to Indiana's water quality may result from the proposed project unless specific conditions are implemented to minimize and mitigate those impacts. Section 401 Water Quality Certification (WQC) is the regulatory mechanism used to ensure that the proposed project will comply with the states water quality standards. If 404(r) is initiated and no WQC is required , IDEM may chose to separately enforce the water quality standards as adopted at 327 IAC 2-1-2.

2. In the Section 404(b)(1) Evaluation portion, the EIS claims that:

   "On-site investigations revealed no reason to believe that the considered fill material is a carrier of contaminants".

   No substantive information is presented in the EIS that supports this claim. Based on data accumulated from past projects on the Ohio River, IDEM has strong reason to believe that the sediment to be removed as result of the locks improvement project contains contaminants which may be present in sufficient levels to trigger Indiana solid waste laws. Therefore IDEM believes that the EIS violates 40 CFR 230.5(i) of the Section 404(b)(1) guidelines.

   IDEM recommends that the sediment and other earthen materials to be removed as a part of the project be tested to determine if contaminants are present and that the EIS be amended to include testing procedures, results, and alternate disposal methods and locations based on the results of these tests.

   Currently, a draft Quality Assurance Project Plan (QAPP) for this project has been submitted by the Corps to IDEM for review and concurrence. Once finalized, IDEM recommends that the sediment be tested in accordance to the procedures identified in this QAPP.

   All sediment removed as a result of the project must be disposed of in accordance to the requirements of 329 IAC 10, governing Solid Waste Land Disposal Facilities.

3. The EIS lacks sufficient information to allow for a determination of sediment disposal site suitability. In addition to the lack of information pertaining to potentially contaminated sediments, the EIS fails to identify containment methods, de-watering methods, transportation routes and methods, and ultimate disposal location. In the event that the dredged material must be de-watered prior to disposal, the return water will be subject to National Pollutant Discharge Elimination System (NPDES) permitting requirements.

   Disposal of dredged material into jurisdictional wetlands violates 40 CFR 230.5(c) of the Section 404(b)(1) guidelines. Alternative disposal sites are presumed to exist and have been identified in the EIS. Under no circumstances will IDEM support the disposal of dredged material into jurisdictional wetlands, which includes areas identified as Farmed Wetlands.

   IDEM recommends that the EIS be amended to include a defined disposal location, transportation methods and routes, containment and de-watering methods, and methods for compliance with any necessary NPDES requirements.

Based on our review of this document, there appear to be significant issues which may effect project cost and configuration which have not been discussed in this EIS. We strongly recommend the Corps incorporate information and discussion of the points listed in this letter. If the Corps fails to amend the draft EIS as recommended, further supplements to the EIS will be required as information becomes available and allows for further review of options and alternatives.

IDEM is committed to continued participation in the Ohio River Mainstem Study team and assistance with the development of environmentally sound options for the J.T. Myers

project. If you have any questions regarding these comments or wish to discuss this project further, please contact Mr. Randy Jones of my staff at 317/233-2473 or Mr. Andrew Pelloso at 317/ 233-2481.

Sincerely,

Matthew C. Rueff
Assistant Commissioner
Office of Water Management

CC: Mr. Michael MacMullen, USEPA- Region 5
Mr. Michael Litwin, USFWS
Mr. Bill Maudlin, IDNR
Mr. Wayne Davis, KYDFWR

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Matthew C. Rueff
Assistant Commissioner
Office of Water Management
Indiana Department of Environmental Management
100 North Senate Avenue
Indianapolis, Indiana 46206-6015

Dear Mr. Rueff:

This is is response to your 15 February 2000 letter providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

1. The Corps of Engineers notes your objection to our pursuit of authorization for the J.T. Myers and Greenup Lock improvements under Section 404(r) of the Clean Water Act. However, we believe that your objection may be in part due to the Corps having not provided sufficient information in the Draft Environmental Impact Statement (DEIS) on our intent. Section 404 (r) allows Congressional authorization of a water resources project with or without specific certification under Section 401 of the Clean Water Act that the project will not violate state water quality standards. It does not, however, exempt the project from the need to comply with state standards. Under our regulations, if the Corps of Engineers intends to pursue authorization of a project under Section 404(r), we must make that intention clear in a DEIS that is circulated for comment. We must also include an evaluation similar to that normally provided under Section 404(b)(1). What the Corps normally provides in a Section 404(b)(1) is outlined in established Corps regulations. These two steps were taken in the DEIS. Our regulations also provide the opportunity to request Section 401 certification from the appropriate state agency while still preserving Congress' option for authorization under Section 404(r). The Corps of Engineers is in the process of requesting Section 401 certification from the State of Indiana for the J.T. Myers project and from the Commonwealth of Kentucky for the Greenup project. This provides each state the opportunity to establish those conditions, through the certification process, they believe necessary to ensure the projects do not violate state water quality standards. Through these actions, along with the circulation of the DEIS for comment, we do not believe we have precluded your opportunity to express your concerns or to work with us to ensure the projects do not violate individual state water quality standards. We value the ideas and inputs of all our environmental partners involved with the Ohio River Mainstem System Study and strongly desire to keep the partnership a viable and productive ingredient in the study. The Executive Summary and Sections 3.2.3.2 and 3.3.3.2 of the FEIS have been modified to clarify the Section 404(r) authorization option.

2. 40 CFR 230.5(i) of the Section 404(b)(1) guideline states "If there is a reasonable probability of chemical contamination, conduct the appropriate tests according to the section on the Evaluation and Testing (Section 230.61)." A Phase I Environmental Assessment was performed in conjunction with the reconnaissance study for the J.T. Myers project in late 1993 to 1994. Based on the Phase I Assessment, the sediments were considered the only earthen materials with a reasonable probability of chemical contamination. Therefore, no testing of the overbank materials has been proposed.

Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging. This testing has not revealed significant sediment contamination. However, the Corps of Engineers proposes to implement a thorough chemical-testing program during the summer of 2000 or 2001. As stated in the comment, the Indiana Department of Environmental

Management (IDEM) is currently reviewing the draft Quality Assurance Project Plan (QAPP), which describes the proposed sediment testing. The testing in the IDEM approved QAPP will help assure compliance with 40 CFR 230.5(i) of the Section 404(b)(1) guidelines and 329IAC 10 criteria.

3. At the J.T. Myers project, the Corps of Engineers has, in the FEIS, identified Disposal Alternative 1A as the recommended site for disposal of excavated materials. The final EIS contains detailed information regarding this disposal site. There are no jurisdictional wetlands within the footprint of this disposal site. The area will be bermed so that runoff from all dredged material will be contained. As there will be no return water, no NPDES permit will be required. We agree that farmed wetlands are present on the Disposal Alternative 2 site. Impacts to this area would be avoided through use of Disposal Alternative 1A. Disposal of dredged material on Disposal Alternative 1A would not impact any jurisdictional "Water of the United States", and therefore, is not reflected in the Section 404 (b)(1) evaluation in Appendix E.

The majority of the excavation for the wrap around culvert takes place in the dry and can be accomplished by conventional means. For those materials with moisture contents suitable for supporting the movement of construction equipment, conventional excavation may be performed using equipment such as self-loading scraper pans, backhoes, trucks, and bulldozers. Excavation in materials with moisture contents unsuitable for conventional equipment will require excavation with draglines or other appropriate equipment.

Excavation for the near site work station (temporary construction moorage area), approach areas, wall monoliths, and miter gate monoliths and sill structure, will, where feasible, be performed from the shoreline using draglines or other suitable equipment. Excavation of materials in the water, outside the reach of conventional shore-based equipment, will require dredging. Due to the added costs and disposal considerations required when dredging, dredging will be minimized, and conventional excavation will be utilized to the maximum practical extent.

In cases where dredging of overburden material is required in addition to drilling and shooting limestone (e.g., for the float-in land wall monolith construction), clamshell dredging is preferable. Drilling is most effectively carried out with some or all of the overburden left place, since the casing can be seated. Also, the blasting will be more effective, with greater fragmentation. Using this approach, much of the silt and sand will necessarily be dredged with the broken limestone, and a clamshell dredge is required. The clamshell bucket should be without teeth and tight fitting so as to prevent loss of material.

Excavated material will be loaded onto scows (with sides) for transport to the stockpile or disposal area. At the unloading site, a shore-based clamshell will unload, although an alternative is a scoop loader on the scow and a conveyor belt. The material will then be stockpiled, if necessary, separating it as reasonable as practical and allowing it to drain. This will be done with a scoop loader, which will also load to trucks for hauling to the disposal area. Appropriate precautions will be taken to limit runoff and containment of the excavated material in the stockpile and disposal area. It is assumed that excavated rock will be recycled and reused by the contractor and will, therefore, not require disposal. A significant portion of the excavated material will be reused as backfill. The remainder of this material will be placed within the 94-acre disposal area identified as Disposal Alternative 1A at the J.T. Myers site. The top of the disposal mound will be limited to elevation 358 or below, which is below the existing road elevation at the site. The FEIS has been modified (Section 2.2.3.4.1) to reflect these procedures.

-3-

The Corps of Engineers appreciates your agency's commitment to continued participation in the Ohio River Mainstem System Study (ORMSS) team to ensure that projects are planned and implemented in an environmentally sound manner. We look forward to working with you on all of the ORMSS products in the future.

Sincerely,

Veronica L. Rife
Project Manager

Frank O'Bannon, Governor
Larry D. Macklin, Director

DNR Indiana Department of Natural Resources

Executive Office
402 W. Washington Street, Rm. W-256
Indianapolis, IN 46204

February 29, 2000

Ms. Veronica Rife, Project Manager
Louisville District
U.S. Army Corps of Engineers
ATTN: PM-C
P.O. Box 59
Louisville, KY 40201-0059

RE: DNR #7877 - Draft Interim Feasibility Report and Environmental Impact Statement for J.T. Meyers and Greenup Locks Improvements, Indiana and Kentucky

Dear Ms. Rife:

The Indiana Department of Natural Resources has reviewed the above referenced draft interim feasibility report and environmental impact statement (DEIS) for the proposed Meyers and Greenup locks improvements. Our agency offers the following comments for your information and in accordance with the National Environmental Policy Act of 1969 (NEPA). Please note, the following comments pertain only to the proposed Meyers lock improvement.

The proposed lock improvement project will require the formal approval of our agency for construction in a floodway pursuant to the Flood Control Act (IC 14-28-1). This requirement was not indicated in Section IX, Table 9-1. Our agency will further assess project impacts on fish, wildlife, and botanical resources during environmental review of the Flood Control Act permit application. Staff may have additional comments, conditions, or limitations upon completion of that review.

The department is concerned that the Meyers lock improvement project has been removed from the Ohio River Mainstem System Study (ORMSS) as an interim project. Our concern involves the cumulative effect that these interim projects will have on biological communities of the Ohio River mainstem. The ORMSS would have addressed this concern, but with the Meyers project being removed from that study, this issue is not adequately addressed in the DEIS. The DEIS states that the locks improvements will not increase navigational traffic, however, it appears that a valid determination of this cannot be made without the information that would be presented through the ORMSS. It appears that the combination of all improvement projects along the Ohio River mainstem will encourage increased traffic which will result in significant impacts to biological resources in the river.

The DEIS does not include consideration for Indiana state-listed species. The Natural Heritage Program's data indicate that several state-listed plant species occur at the Meyers site. These include *Spigelia marilandica* (endangered), *Carex socialis* (rare), *Calycocarpum lyonii* (threatened), *Iresine rhizomatosa* (rare), and *Taxodium distichum* (threatened). These species have been documented in or along the north side of Little Pitcher Lake; the state-endangered northern copperbelly watersnake has also been documented here. The database indicates that *Taxodium distichum* (threatened), *Ludwigia decurrens* (rare), *Nerodia erythrogaster neglecta* (endangered), *Myotis sodalis* (state and federally endangered), and *Nycticus humeralis* (endangered) have been recorded immediately adjacent to proposed alternative disposal site 2. The database indicates the occurrence of *Calocarpum lyonii* (threatened), *Vitis Palmata* (rare), and *Nerodia erythrogaster neglecta* (endangered) within the bottomland forest adjacent to alternative disposal site 3. At a minimum, the DEIS should be revised to include this information and, if appropriate for the NEPA process, an analysis of project impacts on these resources.

The status of the sediments that will be dredged from the river for this project remains a concern for our agency. If contaminated, the sediments may cause environmental harm during the dredging operation and the disposal of the material. We understand that further testing of the sediments will not occur until later in the project development. We note that project costs and, potentially, environmental benefits will be effected should the material have to be disposed of in locations other than the proposed alternatives.

The following issues regarding the proposed disposal sites have not been addressed in the DEIS:

1. In general, the DEIS does not consider the effects of the disposed material on adjacent wetlands that may result from increased water runoff into the wetlands and the effects to the wetlands's water table. There are wetlands adjacent to both the disposal site alternatives 2 and 3. In addition, no wetland delineations have been conducted on disposal site alternatives 2 and 3. Consequently, the issue of further wetland impacts is not addressed.

It is stated that there are about 143 acres of farmed wetlands at disposal site alternative 2. Our agency feels that farmed wetlands will function as wetlands when agricultural practices are stopped, therefore the entire area should be considered wetland in the DEIS. Placing 4 feet of fill material on this area would be a permanent loss of wetland functions in this area. The Division of Fish and Wildlife manages this area and does not favor disposal alternative 2A. Additional wetland impacts at disposal site alternative 3 may also occur if the area is determined to contain wetlands or farmed wetlands.

2. Disposal alternative 1A would place approximately 7 feet of dredged material on 94 acres within the floodway of the river and riverward of Little Pitcher Lake. The biological community associated with Little Pitcher Lake is dependant on maintained hydrology for that area. The 7 feet of fill material in the floodway may decrease or increase the available water to the Little Pitcher Lake area. Both situations can impact the biological community in this area; this should be addressed or considered in the DEIS.

3. We recommend that all disposal site alternatives include reduced grading so that the finished grade would contain shallow depressions that would temporarily hold water.

4. Page 252 contains the statement, "The Meyers project would include mitigation features that will result in a no net loss of floodplain and riparian habitat values, in-kind and on-site." The placement of 7 feet of material on this area will have an effect on the occurrence of inundation of this area which does effect floodplain and riparian habitat values. This effect has not been mitigated either in-kind or on-site.

The department has developed wetland and other habitat mitigation guidelines which were included in our April 7, 1999 letter to your agency regarding the proposed project. The minimum mitigation ratio requirement for impacts to forested wetlands and bottomland forest is 4:1 (mitigation acres:disturbed acres). This mitigation ratio will be required for this project before consideration of the Flood Control Act permit application.

Page G-32 states that "The recommended plan was chosen ...and is supported by ...the wildlife resource agencies of the States of Indiana ...." **The Indiana Department of Natural Resources has not reviewed this mitigation plan prior to receiving this DEIS.** According to the calculations for habitat units, there will still be a loss of habitat units after completing the proposed in-river projects. We suggest that additional mitigation can be achieved through the purchase of the private land on the Indiana bank of the Ohio River between the Meyers dam and the Wabash River, purchase of private land on the Indiana bank of the Wabash river from the Ohio River to approximately Wabash River mile 1, and reforestation and stabilization of these river banks.

Steve Jose and Tom Flatt are incorrectly affiliated with the Illinois DNR in Table 10-2, page 280. Both are employees of the Indiana Department of Natural Resources. The name Mark Poshon is misspelled in Table 10-4, page 281; the correct spelling is Pochon.

Our agency appreciates the opportunity to review and comments to the DEIS and looks forward to working with your agency in the future. Please contact Bill Maudlin at 317-232-4080 if there are questions or need for discussion of these comments.

Sincerely,

for Larry D. Macklin, Director
Department of Natural Resources

LDM:WM

cc: Brian Abrell, IDNR Nature Preserves, Winslow, IN
John Bacone, IDNR Nature Preserves, Indianapolis, IN
Dale Gick, IDNR Water, Indianapolis, IN
Gary Jordan, IDNR Fish and Wildlife, North Vernon, IN
Mike Litwin, U.S. Fish and Wildlife Service, Bloomington, IN
Deb Mignogno, U.S. Fish and Wildlife Service, Cookeville, TN
Andrew Pelloso, Water Quality Standards Section, IDEM, Indianapolis, IN
Mark Pochon, IDNR Fish and Wildlife, Mount Vernon, IN
Tom Stefanavage, IDNR Fish and Wildlife, Winslow, IN

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Larry D. Macklin
Director
Indiana Department of Natural Resources
402 West Washington Street, Room W-256
Indianapolis, Indiana 46204

Dear Mr. Macklin:

This is in response to your 29 February 2000 letter providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio. Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

Section IX of the FEIS has been revised to reflect the need for a Flood Control Act permit from your agency.

The Greenup and J.T. Myers reports are interim reports identified for individual treatment during the ORMSS. This approach was discussed in the Notice of Intent published in the Federal Register on October 28, 1998. The need for accelerating these two projects was due to the high costs associated with delays during closure of main chambers at the projects. Recommendation of these projects for authorization at this time does not affect decisions on the need for or justification of any future major navigation projects on the mainstem Ohio River. Neither do these two projects depend on other potential major navigation improvements along the mainstem for their justification. Their economic and navigation benefits are unique to the structural and reliability disposition of each project. Further, a large proportion of their constituent traffic is of a local nature. Each is individually justified on its own benefits and is independent of other possible future major navigation improvements in terms of their utility and benefits. The environmental impacts of these projects have also been found to be largely local. The extent and influence of limited site-specific impacts associated with the proposed enhancements make consideration of these projects reasonable in their own context.

Section IV of the FEIS addresses cumulative impacts of proposed actions at the J.T. Myers and Greenup Locks and Dams. The Corps of Engineers understands that the Ohio River supports a continuum of resources along its length. We also agree with the importance of addressing system-wide cumulative impacts which could result from the combination of all major navigation improvements. This will certainly become an issue of great concern as we explore options which may impact system-wide resources during the course of the ORMSS. Therefore, we are committed to performing an assessment of system-wide cumulative effects on resources along the river corridor in the next report dealing with major navigation improvements on the mainstem. We are currently revising the study plan with emphasis on completing the Master Plan in the next report on major navigation improvements under the ORMSS. It appears likely, at this time, that the document will include both a Master Plan and feasibility level authorization reports. Regardless of the direction of the next report, the Corps of Engineers will include appropriate studies to assess past, present, and reasonably foreseeable future actions by the Corps of Engineers and others.

We have added state-listed species to the FEIS (Section 3.3.5.1.3). However, the species documented along the north side of Little Pitcher Lake will not be impacted by construction at the preferred alternative (Disposal Alternative 1A) since no work will occur near or in this area. The other state-listed species listed in your letter are known to be near Disposal Alternative sites #2 & #3. We have previously

submitted a letter to you (dated 28 March) requesting concurrence in the elimination of Disposal Alternative sites 2 & 3 in favor of use of Disposal Alternative 1A.

Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging. This testing has not revealed significant sediment contamination. However, the Corps of Engineers proposes to implement a thorough chemical-testing program during the summer of 2000 or 2001. The Indiana Department of Environmental Management (IDEM) is currently reviewing the Draft Quality Assurance Project Plan (QAPP), which describes the proposed sediment testing.

The following responses correspond to the issues you raised regarding disposal sites:

1. Disposal Alternative 1A is our recommended site, therefore we do not anticipate impacts to jurisdictional wetlands.

2. The Uniontown, KY-IN quad sheet shows that all drainage enters Little Pitcher Lake from the north or the east. The area to the south (the disposal area) is very flat and the ground slopes to the lake only from the small wooded area immediately adjacent to the stream. The disposal area should have no hydrologic impact on Little Pitcher Lake. However, raising Disposal Alternative 1A would have an impact by reducing the amount of backwater flooding from the Ohio River. This would mean less flooding to this site, which should be beneficial to the re-established prairie community. See Section 3.3.5.2.2 of the FEIS.

3. We will grade the disposal site so that shallow depressions are left. See Section 3.3.5.2.2 of the FEIS.

4. The FEIS (Section 3.3.5.2.2) has been changed to indicate a minor modification of the floodplain using Disposal Alternative 1A. However, the disposal site will be totally restored, with a higher quality and more productive prairie area than currently exists. We will resolve ground compaction problems by the use of low ground pressure equipment, and will ensure that adequate nutrients and organic material are present for a successful riparian area. This will result in a positive impact to floodplain and riparian habitat values. Restoration of the disposal site prairie is considered an environmental design feature and is not considered mitigation.

No forested wetlands will be impacted by the preferred disposal alternative. In addition, no losses of bottomland forests would occur, as the 94-acre disposal site consists of 20 acres of prairie, 63 acres of frequently maintained open grassland, and approximately 11 acres of scrub-shrub habitat. We have estimated, at the worst case, that we would lose 5 acres due to bank shaping downstream of the project on the Indiana shore. We have included 20 acres of mitigation (4:1 ratio), with 10 acres on existing Government land, and the remaining 10 acres to be purchased from nearby riparian landowners.

Page G-32 has been modified to indicate that the recommended plan has been discussed with staff of Indiana DNR.

We apologize for incorrectly associating Steve Jose and Tom Flatt with Illinois DNR and for the incorrect spelling of Mark Pochon. These have been corrected in appropriate places in the FEIS.

Thank you for your comments on the J.T. Myers and Greenup proposed lock improvement projects and for your interest and participation in the ORMSS.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

USDA UNITED STATES DEPARTMENT OF AGRICULTURE

Natural Resources Conservation Service

771 Corporate Drive
Suite 110
Lexington, KY 40503
(606) 224-7350

SUBJECT: ECS – Review of Draft Environmental Impact Statement

DATE: February 7, 2000

TO: Kenneth Besser
Chief, Planning Branch
Department of the Army
U.S. Army Engineer District, Louisville
PO Box 59
Louisville, KY 40201

FILE CODE: 190-15-13

Dear Mr. Besser

The USDA Natural Resources Conservation Service, Kentucky operations, was forwarded copies of the Draft Interim Feasibility Report and Environmental Impact Statement for J.T. Myers and Greenup Locks Improvements, Indiana and Kentucky. We have reviewed the document and have concluded that no planned actions occur on non-submerged, private lands in the State of Kentucky. We defer any comments concerning impacts to farmlands, wetlands, and uplands associated with the J.T. Myers Locks Improvements to the respective NRCS office for Indiana. We have no comments concerning environmental impacts as a result of activities planned for submerged lands. However, we do point out the following observations about the Draft Environmental Impact Statement:

1) There is no reference to how the proposed federal action associated with the J.T. Myers Locks and Dam project has complied with requirements of the Farmland Protection Policy Act of 1981. Specifically, it appears the implementation of alternative 2B and 3B, disposal of material on farmland, may be subject to evaluation under this law.
2) There appears to be inconsistencies on several wetland determination worksheets and subsequent wetland determinations associated with the proposed J.T. Myers and Greenup Locks Improvements and we recommend they be reviewed. Several of the worksheets indicated the presence of hydric vegetation and hydrology. The investigator checked "yes" indicating the soil map unit was listed on the national hydric soils list and confirmed the soil map unit was present on the site. However, the sampling point was not considered a wetland as the investigator indicated no hydric soil conditions were present.

Sincerely,

JACOB KUHN
State Liaison

Cc: Diane E. Gelburd, Director, Ecological Sciences Division, USDA-NRCS, Washington, D.C.
Jane Hardesty, State Conservationist, USDA-NRCS, Indiana
Kevin Brown, State Conservationist, USDA-NRCS, Ohio

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Jacob Kuhn
State Liaison
United States Dept. of Agriculture
771 Corporate Drive
Suite 110
Lexington, KY 40503

Dear Mr. Kuhn:

This is in response to your letter dated February 7, 2000 to Mr. Kenneth Besser providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

We have coordinated with Marcia Droege of the USDA regarding the Farmland Protection Policy Act of 1981. In an email exchange with Ms. Droege regarding Disposal Alternative 1A, she stated "Because the area is not considered cropland you are not required to file a AD-1006 at this time, but you will need to send a written statement outlining what is planned for the area to: John R. Reynolds ... " We have submitted this memo to Mr. Reynolds, but as of the date of this letter have not received a response. In addition, Ms. Droege stated " I have checked Farm Services Agency (FSA) records and found no cropping history. I discussed the area with Greg Knowles, CED and he stated that the area is not now considered cropland, and they have no records to show that it ever was cropland. I then checked our maps back to 1953 and found that part of the area in question was converted from cropland sometime between 1953 and 1965, when the USACE first began construction on the J. T. Myers Locks and Dam. Part of the area was still forested in 1953 before construction".

Alternative disposal sites 2 and 3 referenced in your letter are farmland areas, but these sites have not recommended as disposal areas. Therefore, it is our determination that we have complied with the requirements of the Farmland Protection Policy Act of 1981.

In your letter you noted that the soil map unit at the JT Myers site appears on the National Hydric Soils List. For most purposes, however, listing on a hydric soils list is insufficient evidence to conclude the presence or extent of hydric soils on a site. There is always a need to verify the specific conditions with an on-site investigation for hydric soil indicators.

A member of the Louisville District staff inspected the site again on April 5, 2000. The on-site analysis of this soil failed to reveal any hydric soil indicators for the mapping unit or the presence of any hydric soil inclusions within this mapping unit. The analysis revealed that the upper part of the soil profile (0-6 inches) has a matrix color of 10 YR 3/2 with a texture of silty clay loam (0-3 in) and sandy loam (3-6 in). This color (although manifesting a chroma of 2) is more indicative of an accumulation of dark organic matter than from the processes associated with anaerobiosis and the subsequent reduction of iron.

Therefore, we agree with the conclusion of our consultant, Gulf Engineers and Consultants, and have determined that no jurisdictional wetlands occur on this disposal site.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica Rife

Veronica L. Rife, P.E.
Project Manager

Veronica Rife ATTM: PM-C
Department of the Army
U.S. Army Engineer District, Louisville
Corps of Engineers
P.O. Box 59
Louisville, KY 40201-0059

Re: Interim Feasibility Report: J.T. Myers Improvements

Dear, Ms Rife:

My name is Don Mottley, I am Spokesperson for Save Our Rivers an unincorporated association in Southwest, Indiana. A few of us attended your meeting on February 14, 2000, at Mt Vernon High School in Posey County, Indiana. We reviewed 3 alternatives and have come to the conclusion that alternative number one would be the least damaging and practicable alternative for this project. We base this on the following:

1. The proposed disposal area in alternative number one would have no impacts to jurisdictional wetlands;
2. Alternative number one has minimal impacts to terrestrial habitat.
3. Alternative number one has minimal if any impacts to threatened and endangered species.
4. Alternative number one would be the most cost effective of the three alternatives presented to us.

5. The only item left of concern would be the dredged material its self. We believe there should be some testing now to identify an contaminated dredged materials. This would also give the Corps an idea of any cost associated with the proper disposal of any contaminated materials. Then before any dredging operations begin there should be another sampling done since the possibility of spills in, around or near the J.T. Myers dam are possible. This would then allow for the proper disposal of any new contamination that would have an adverse impact to the environment.

Therefore, Save Our Rivers would recommend that Alternative number one be authorized and conditioned to include pre and post sampling of all dredged materials at the J.T. Myers site. Thank you for your time and consideration into this matter.

Respectfully submitted,

Don Mottley

Don Mottley, Spokesperson
Save Our Rivers
6222 Yankeetown Rd
Boonville, IN 47601

cc: IDEM 401 WQC Section
Attn: Andrew Pelloso

IDNR, Division of Water

Hoosier Environmental Council
Attn: Tim Maloney

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Don Mottley
Spokesperson
Save Our Rivers
6222 Yankeetown Rd
Boonville, IN 47601

Dear Mr. Mottley:

This is in response to your Memorandum faxed to our office on February 29, 2000 providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

In the FEIS, the Corps of Engineers has identified Disposal Alternative 1A as the recommended site for disposal of excavated materials for the J.T. Myers project. The final EIS contains detailed information regarding this disposal site. There are no jurisdictional wetlands within the footprint of this disposal site.

Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging. This testing has not revealed significant contamination in the sediments. However, the Corps of Engineers proposes to implement a thorough chemical testing program during the summer of 2000 or 2001. The Indiana Department of Environmental Management (IDEM) is currently reviewing the work plan that describes the proposed testing. The need for an additional testing episode closer to actual construction will be implemented should a spill occur subsequent to the proposed testing.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife

Veronica L. Rife, P.E.
Project Manager

Department of Public Utilities
Greenup Hydro Facility

City of Hamilton, Ohio
3263 Kenyon Rd.
Franklin Furnace, Ohio 45629
Telephone 740 574-8427
FAX 740 574-8252

Founded 1791

February 28, 2000

Veronica Rife, Project Manager
U.S. Army Engineer District, Louisville
P.O. Box 59 ATTN: PM-C
Louisville, KY 40201-0059

Dear Ms. Rife:

The City of Hamilton, Ohio ("Hamilton") submits these comments on the draft Interim Feasibility Report concerning improvements at J.T. Myers Locks and Dam and at Greenup Locks and Dam pursuant to the Corps of Engineers' Notice of Availability (December 1999). According to the Notice of Availability, the Interim Report recommends that the Greenup L&D land-side lock chamber be extended from 600 feet to 1200 feet in length, and that a Major Rehabilitation of the riverside lock chamber be undertaken. Hamilton is concerned that any modifications to the Greenup Locks and Dam not require any alterations to the physical structures of Hamilton's Greenup Hydroelectric Project, especially the Project transmission line.

Hamilton is owner and operator of the Greenup Hydroelectric Project, and holds a license issued by the Federal Energy Regulatory Commission under the Federal Power Act for the construction, operation, and maintenance of the facility (FERC licensed Project No. 2614). The license was issued March 29, 1976 to the City of Vanceburg, Kentucky, and subsequently transferred to Hamilton. The license is subject to fifty-four terms and conditions in the form of standard articles 1-6, 8-19, and 21-37, and special articles 38-56. The Greenup Project, which has a licensed capacity of 70.56 megawatts, supplies nearly fifty percent of the native load energy requirements of Hamilton's municipal electric system. Any down time associated with obtaining FERC approval for an amendment to the license and relocating the project transmission line could impact severely on Hamilton's electric system operations.

The principal project works described in Hamilton's FERC license include a concrete powerhouse approximately 185 feet long by 175 feet wide at elev. 517 feet msl; three horizontal-axis, bulb-type Kaplan turbines rated at 33,000 hp each; a concrete tailrace canal approximately 100 feet long by 154 feet wide; and a 14.48-mile long, single circuit 138-kV transmission line extending from the power plant to Kentucky Power Company's Fullerton Substation. Enclosed for your reference is a segment of a drawing, excerpted from Hamilton's FERC-approved Exhibit G, Sheet 3 of 6, showing the transmission line from the Project powerhouse traversing the Ohio River. Please be advised that the licensed transmission line includes a uniform 100-foot wide right-of-way extending 50 feet on each side of centerline. The Greenup Locks and Dam are located immediately downstream of Hamilton's licensed transmission line as it crosses into

Kentucky, as shown on the enclosed drawing.

As the licensee, Hamilton is ultimately responsible to FERC for all activities at the licensed Project, including operation, maintenance, and compliance with license conditions. Hamilton is prohibited by the terms of the Federal Power Act and its license from undertaking any modifications to the Project, including by not limited to relocation of any Project works, without the prior approval of the FERC. Article 3 of the license provides that "there shall not be made without prior approval of the Commission any substantial alteration or addition not in conformity with the approved plans to any....project works under the license or any substantial use of project lands and waters not authorized herein...." License Article 2 provides that "no substantial change shall be made in the maps, plans, specifications, and statements described and designated as exhibits and approved by the Commission in its order as a part of the license until such change shall have been approved by the Commission."

In order to effectuate any such change in project works or plans, Hamilton is required to file an application for amendment of license pursuant to the FERC's Regulations Under the Federal Power Act, 18 C.F.R. §§ 4.200 *et seq.* Such an application must include appropriate exhibits to the extent necessary to describe and support the proposed amendment. In acting on such application for amendment, the FERC applies the same standards it does in acting on license applications, *i.e.*, whether the proposal is in the public interest, and must take into consideration the protection, mitigation and enhancement of fish and wildlife resources and the preservation of other aspects of environmental quality. The FERC also has recently shown increased sensitivity to landowner concerns.

The process for obtaining an amendment to the license can be time-consuming, burdensome, expensive, and uncertain. Changes in transmission lines heighten these concerns due to the linear extent of land affected. In the case of a transmission line crossing a river, as Hamilton's line does, potential environmental impacts on raptors and aquatic habitat would likely be examined by the FERC and by fish and wildlife agencies. For the reasons expressed herein, Hamilton most urgently requests that any modifications undertaken by the Corps at Greenup Locks & Dam not require or involve relocation of any physical features of Hamilton's licensed Project No. 2614, particularly including the existing placement of the Project transmission line and its supporting structures.

Very truly yours,

Wayson Cooper

Wayson Cooper
Superintendent, Greenup Hydro

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Wayson Cooper
Superintendent
City of Hamilton Ohio
Department of Public Utilities
Greenup Hydro Facility
3263 Kenyon Rd.
Franklin Furnace, Ohio 45629

Dear Mr. Cooper:

This is in response to your letter dated February 28, 2000 providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

We appreciate your concern for the uninterrupted operation of the Greenup hydropower facility under the current license. We have considered the potential for impacts to your facility throughout the planning process. The current Greenup project will not require relocation of any parts of the hydropower facility, including the transmission lines.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

Old Centrum
520 East 12th Street
Indianapolis, IN 46202
Phone (317) 685-8800
Fax (317) 686-4794
E-mail hecindy@indy.net

Hoosier Environmental Council

February 29, 2000

Veronica Rife, Project Manager
U.S. Army Corps of Engineers
PO Box 59 Attn: PM-C
Louisville, KY 40201-0059

RE: Interim Feasibility Report for JT Myers Locks Improvements

Dear Ms. Rife:

The Hoosier Environmental Council supports Alternative One for improvements of the JT Myers Locks, as the most environmentally preferable and most cost effective alternative.

We also recommend that the material to be dredged for this project be tested for contaminants prior to the beginning of the project. This will provide the necessary information for proper disposal of this material.

Thank you for your consideration.

Sincerely,

Tim Maloney
Hoosier Environmental Council

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Tim Maloney
Hoosier Environmental Council
Old Centrum
520 East 12th Street
Indianapolis, In 46202

Dear Mr. Maloney:

This is in response to your letter dated February 29, 2000 providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

In the FEIS, the Corps of Engineers has identified Disposal Alternative 1A as the recommended site for disposal of excavated materials for the J.T. Myers project. The final EIS contains detailed information regarding this disposal site. There are no jurisdictional wetlands within the footprint of this disposal site.

We concur with the dredged material testing recommendation. Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging activities. This previous testing has not revealed significant contamination in the sediments. However, the Corps of Engineers proposes to implement a thorough chemical testing program during the summer of 2000 or 2001. The Indiana Department of Environmental Management (IDEM) is currently reviewing the work plan that describes the proposed testing.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

February 14, 2000

US Army Corps of Engineers
Louisville District

COMMENTS TO:
U.S. ARMY CORPS OF ENGINEERS
OHIO RIVER MAINSTEM SYSTEMS STUDY

NOTE: Draft Interim Feasibility Report, J. T. Myers and Greenup Locks Improvements written statements turned in at this meeting or received at the address below by February 29, 2000 will become part of the Ohio River Mainstem Systems Study record and will be given due consideration in completion of the final report.

My family farms land owned by Hazel Harshaw and Charles Ellert along the river at the J. T. Myers locks. The river bank has severe erosion. The boats going in and out the locks hang close to the Indiana shore; therefore, they cause large waves that wash against the shore. Large trees used to be on the bank, but most are gone now.

J. T. Myers Dam site used to be a nice place for recreational activities. Kids rode bikes, roller skated, played games, and did other activities at the site. That area was taken away and now it is grown up in weeds, some of which are noxious. Trash and drift has taken over the area. It looks terrible. The area used to be mowed and well taken care of.

NAME Carolyn Brauser
GROUP/AGENCY Brauser Farms
ADDRESS 12815 Hwy 69 S STATE Mt Vernon ZIP 47620

Return by mail to: Veronica Rife, Project Manager
U.S. Army Engineer District, Louisville
P.O. Box 59 Attn: PM-C
Louisville, KY 40201-0059

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Ms. Carolyn Brauser
Brauser Farms
12815 Hwy 69 S
Mt. Vernon, IN 47620

Dear Ms. Brauser:

This is in response to your letter dated February 14, 2000 providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

The proposed improvements at John T. Myers Locks and Dam will not increase the amount of barge traffic passing through this location. Neither will the proposed project affect the problem you have described.

The changes to the recreational facilities that have occurred at J.T. Myers Locks and Dam were the result of several circumstances, none of which are affected by the proposed project. When it became necessary to provide a more modern facility, the decision was made to build it closer to the locks, to provide better security. With the identification of the proposed locks improvements at J.T. Myers and the impact due to construction activities, it was determined to defer the replacement of the recreational facility until the locks improvements were complete.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

JAMES E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

February 25, 2000

Ms. Veronica Rife Project Manager
Attn: PM-C
U S Army Engineer District Louisville
P O Box 59
Louisville KY 40201-0059

Re: Interim Feasibility Report: Draft Main Report and Draft EIS for J T Myers and Greenup Locks Improvements on Ohio River at Posey County, Indiana/Kentucky and Greenup County, Ohio/Kentucky respectively. (SERO 2000-04)

The Natural Resources and Environmental Protection Cabinet (NREPC) serves as the state clearinghouse for review of environmental documents generated pursuant to the National Environmental Policy Act (NEPA). Within the Cabinet, the Commissioner's Office in the Department for Environmental Protection **coordinates** the review for Kentucky State Agencies.

The Kentucky agencies listed on the attached sheet have been provided an opportunity to review the above referenced report. Responses were received from nine (also marked on attached sheet) of the agencies that were forwarded a copy of the document. Attached are comments from the Divisions of Water, Waste Management, and the Kentucky Nature Preserves Commission. Also attached is a copy of a letter with comments that was sent previously from the Kentucky Heritage Council.

If you should have any questions, please contact me at (502) 564-2150, ext. 112.

Sincerely,

Alex Barber
State Environmental Review officer

Enclosure

EDUCATION PAYS

Printed on Recycled Paper

NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
ENVIRONMENTAL REVIEW

Interim Feasibility Report: Draft Main Report and Draft E I S for J T Myers and Greenup Locks Improvements on Ohio River at Posey County, Indiana/Kentucky and Greenup County, Ohio/Kentucky respectively.

The following agencies were asked to review the above referenced project. Each agency that returned a response will appear below with their comments and the date the project response was returned.

C denotes Comments
NC denotes No Comment
IR denotes Information Request
NR denotes No Response

REVIEWING AGENCIES:

Division of Water	comments
Division of Waste Management	comments
Division for Air Quality	nc
Department of Health Services	
Economic Development Cabinet	
Division of Forestry	
Department of Surface Mining Reclamation & Enforcement	nc
Department of Parks	
Department of Agriculture	
Nature Preserves Commission	nc
Kentucky Heritage Council	comments
Division of Conservation	nc
Department for Natural Resources	
Department of Fish & Wildlife Resources	comments
Transportation Cabinet	
Department for Military Affairs	nc

JAMES E. BICKFORD
SECRETARY

PAUL E. PATTON
GOVERNOR

COMMONWEALTH OF KENTUCKY
NATURAL RESOURCES AND ENVIRONMENTAL PROTECTION CABINET
DEPARTMENT FOR ENVIRONMENTAL PROTECTION
FRANKFORT OFFICE PARK
14 REILLY RD
FRANKFORT KY 40601

February 1, 2000

Division of Waste Management

Comments for Project #SER02000-4

Construction and demolition debris must be disposed in accordance with DWM regulations. If waste material is to be used for beneficial re-use or is classified as a special waste, permits required must be obtained prior to disposal activities.

During projects such as this, old regulated and non-regulated underground storage tanks may be encountered, as well as other contamination. If this occurs whatever is encountered must be properly reported and remediated.

Applicant must also comply with regulatory requirements for disposal in the 100 year floodplain and stream construction permitting.

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Natural Resources and Environmental Protection Cabinet
Department for Environmental Protection
Division of Waste Management
Frankfort Office Park
14 Reilly Rd
Frankfort, KY 40601

To Whom It May Concern:

This is in response to your 1 February 2000 memorandum providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

All waste generated by the John T. Myers project will be disposed of in the state of Indiana. These concerns have all been addressed in response to the appropriate Indiana agencies.

All waste generated by the Greenup project will be disposed of in the Commonwealth of Kentucky. All disposal materials will be disposed in accordance with DWM and appropriate permits will be obtained prior to disposal actions. Any underground storage tank encountered during future activities will be properly reported and remediated. Disposal of material within the 100-year floodplain or stream construction will be done in compliance with regulatory requirements, including all appropriate permits.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

Copy Furnished:
Mr. Alex Barber
State Environmental Review Officer
Department for Environmental Protection
Frankfort Office Park
14 Reilly Road
Frankfort, Kentucky 40601

COMMONWEALTH OF KENTUCKY
DEPARTMENT OF FISH AND WILDLIFE RESOURCES
C. THOMAS BENNETT, COMMISSIONER

February 18,2000

Department for Environmental Protection
Commissioner's Office
ATTN: Alex Barber
14 Reilly Road
Frankfort, KY 40601

RE: Project No. SER02000-4, Interim Feasibility Report: Draft Main Report and Draft EIS for JT Myers and Greenup Locks Improvements on Ohio River at Posey County, Indiana/Kentucky and Greenup County, Ohio/Kentucky, repectively – Louisville District Corps of Engineers.

Dear Mr. Barber:

Members of my staff have reviewed the above-referenced document. Accordingly, we offer the following comments and recommendations.

The Kentucky Department of Fish and Wildlife Resources (KDFWR) has been involved with the Ohio River Mainstem Study (ORMSS) for several years and have had many meetings with the Corps of Engineers and the other state and federal agencies on the project. During that time we have become familiar with the two projects and have had an opportunity to assist in the development of mitigation for the impacts to the projects.

As a result of that involvement, KDFWR has very few comments on the above-referenced document. Our comment involves the mitigation that is proposed for the JT Myers Lock Improvement Project. There are currently eight (8) mitigation projects proposed, including one for protecting the head of Stewart Island from erosion (#5). Currently, there is no problem with erosion to the head of the island and we do not anticipate future problems. The most immediate problem is with riverbank erosion along the eastern side of the island. Several acres of land have been lost during the past two decades, which has resulted in the loss of terrestrial wildlife habitat and the smothering of adjacent shallow water aquatic habitat. Since this island is leased to KDFWR for a wildlife management area, these losses impact the fish and wildlife populations and the recreational value of the property.

Therefore, KDFWR requests the mitigation proposal for Stewart Island be modified to address the existing problem with riverbank erosion along the eastern shore of the island. This has been designed as part of the future Environmental Restoration Project that is being proposed as part of the ORMSS. The engineering details have been developed and are on file with the Planning Division of the Louisville District Corps of Engineers. It has been designated as KY-15 and is one of Kentucky's 8 Draft Concept Reports and was prepared by Parsons Engineering Science, Inc. (Parsons ES Job No. 735914).

EDUCATION PAYS

Arnold L. Mitchell Bldg. #1 Game Farm Road Frankfort, Ky 40601

If KDFWR's comments and recommendations are included into the Final Interim Report and EIS, then KDFWR has no objections to the project.

We appreciate the opportunity to comment.

Sincerely,

C. Tom Bennett
Commissioner

CTB/WLD/kh

cc: Peter W. Pfeiffer, Director, Division of Fisheries
Edwin F. Crowell, Asst, Director, Division of Fisheries
David E. Bell, Northwestern Fishery District Biologist
Paul W. Rister, Western Fishery District Biologist
Lewis E. Kornman, Northeastern Fishery District Biologist
Pat Brandon, Purchase Regional Wildlife Supervisor
Veronica Rife, Louisville District Corps of Engineers
Lee A. Barclay, USFWS, Cookeville, TN
Environmental Section Files

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

C. Tom Bennett
Commissioner
Kentucky Department of Fish and Wildlife Resources
Arnold L. Mitchell Bldg.
#1 Game Farm Rd
Frankfort, KY 40601

Dear Mr. Bennett:

This is in response to your 18 February 2000 memorandum to Mr. Alex Barber providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

We dropped the Stewart Island mitigation proposal, and replaced it with the KY-15 Ecosystem Restoration proposal as requested. See Appendix G of the FEIS, pg G-26, Project site 5.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

Copy Furnished:

Mr. Alex Barber
State Environmental Review Officer
Department for Environmental Protection
Frankfort Office Park
14 Reilly Road
Frankfort, Kentucky 40601

Education, Arts and Humanities Cabinet

KENTUCKY HERITAGE COUNCIL
The State Historic Preservation Office

Paul E. Patton
Governor
Marlene M. Helm
Cabinet Secretary

David L. Morgan
Executive Director and
SHPO

February 14, 2000

Ms. Veronica Rife
Project Manager
Louisville District
U. S. Army Corps of Engineers
P.O. Box 59 ATTN: PM-C
Louisville, Kentucky 40201-0059

Dear Ms. Rife:

The Kentucky Heritage Council has reviewed the referenced documents entitled "Interim Feasibility Report: J. T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio" and "Draft Main Report and Draft Environmental Impact Statement". These documents discuss proposed improvements to the J. T. Myers Locks in Union County and the Greenup Locks in Greenup County. We have previously reviewed an archaeological study for the Greenup Lock Extension project and have coordinated with the Huntington District of the U. S. Army Corps of Engineers. Sites 15Gp112 and 15Gp318 were located during the survey and subsequently subjected to Phase II testing. Site 15Gp112 was considered eligible and Site 15Gp318 was considered potentially eligible for listing in the National Register of Historic Places. The Huntington District stated that both sites have been deleted from the Contractor Work Limits for the Greenup Lock Extension Project and will not be affected by the proposed project. Since sites 15Gp112 and 15Gp318 will not be affected by the proposed project, our determination of effect pursuant to 36CFR Part 800.4 (d) of the Advisory Council's revised regulations is No Historic Properties Affected. Therefore, the U. S. Army Corps of Engineers responsibility to consult with the Kentucky State Historic Preservation Officer under the Section 106 review process is fulfilled for the Greenup Lock Extension project.

We have not yet commented on cultural resource studies for the J. T. Myers Locks project. On page 242 of the Draft Environmental Impact Statement, provision is made for conducting archaeological surveys of disposal alternatives. It appears that most of the potential for impacting cultural resources will be on the Indiana side of the Ohio River. We look forward to future consultation on the J. T. Myers Locks project. Should you have any questions, feel free to contact Charles Hockensmith of my staff at (502) 564-7005.

Sincerely,

David L. Morgan, Director
Kentucky Heritage Council and
State Historic Preservation Officer

cc: Mr. Alex Barber

300 Washington Street
Frankfort, Kentucky 40601

Telephone (502) 564-7005
FAX (502) 564-5820

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

David L. Morgan
Director
Kentucky Heritage Council and
State Historic Preservation Office
300 Washington Street
Frankfort, KY 40601

Dear Mr. Morgan:

This is in response to your 14 February 2000 Memorandum providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

As noted, consultation with the Kentucky State Historic Preservation Officer under the Section 106 review process has been fulfilled for the Greenup Lock Extension project. The potential for impacting cultural resources from the J.T. Myers project is only projected for the Indiana side of the Ohio River. Should any project actions require effort on the Kentucky bank for the Myers project, the district will engage with your office. In addition, a Programmatic Agreement addressing all activities associated with the Ohio River Main Stem Study is being developed. This Agreement will formalize all coordination needs for future work.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

Copy Furnished:

Mr. Alex Barber
State Environmental Review Officer
Department for Environmental Protection
Frankfort Office Park
14 Reilly Road
Frankfort, Kentucky 40601

SIERRA CLUB
FOUNDED 1892

MIDWEST OFFICE

Mississippi River Protection Program
February 24, 2000

Vernonica Rife
Project Manager
US Army Engineer District, Louisville
P.O. Box 59 Attn. PM-C
Louisville, KY 40201-0059

Dear Ms. Rife,

The Midwest Regional Office of the Sierra Club, a national environmental not-for-profit organization with over 500,000 members is interested in commenting on the US Army Corps J.T. Myer and Greenup Locks Improvements Interim Feasibility Report. The comments are scheduled to be in your office by February 29, 2000. The Sierra Club would like to request a 30 day extension for filing of comments on this report.

The Sierra Club has several reasons for requesting this delay. We first initiated communication with your office about the last week of January. Due to your travel schedule we did not receive a reply until 2-9-2000. We sent in a request for the Draft Report on 2-9-00 by US Postal Service Priority Mail for CD copies of this report but as of 2-24-00 have not received this information. Second, while much of the report was available for download from the Louisville Web Site during this time period, the Environmental Impact Statement was not yet available for download until after Feb. 18, 2000. We are presently downloading this information and we appreciate the posting to the web, but the failure to include the EIS information on a timely basis within the review period has caused us delays in being able to review this information.

Finally, there are concerns the Sierra Club has over proposals being advanced for inland waterway navigation improvements at this time. Recent revelations concerning "instructions" various districts within the Corps have received to promote inland waterway navigation projects (Washington Post 2-14-2000 & 2-24-2000, see attachments) call into question the priorities for projects within the inland waterway system. We wish to review this project in the context of this new information.

We appreciate the prompt consideration of this request.

Sincerely,

Mark N. Beorkrem

Mark N. Beorkrem
Regional Representative
Midwest Region
Sierra Club
P.O. Box 370
Morrisonville, IL 62546
217-526-4480
mbeorkrem@hotmail.com

cc: Carl Zichella, Regional Manager, Sierra Club
Tim Searchinger, Attorney, Environmental Defense Fund
Joseph Westphal, Assistant Secretary for Civil Works, U.S. Army Corps of Engineers

SIERRA CLUB
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MIDWEST OFFICE
Mississippi River Protection Program

March 16, 2000

Ms. Veronica Rife
Project Manager
U.S. Army Engineer District, Louisville
Federal Building, Room 765
600 West Dr. Martin Luther King Place
Louisville, KY 40202

Dear Ms. Rife,

The Midwest Office of the Sierra Club, representing Sierra Club Chapters in the region bisected by the Ohio River Mainstem Project is writing to comment on the Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements dated December 1999. The Club represents over 600,000 members in all fifty states and members are actively involved in recreation, work and life within the project region as outlined in the Feasibility Report. We appreciate your granting an extension of comment time on the report to March 17, 2000 due to delays in receiving the documents, but also note that the final comments on the Feasibility Report from the U.S. Fish & Wildlife Service, dated February 18, 2000, we were forced to get directly from the Service. The haste in producing this report without a final USFWS document is troublesome and would seem to violate the intent if not the letter of the law regarding submittal of Draft Reports for public review.

Our first comments are regarding the submission of the J.T. Myers and Greenup Projects ahead of the ongoing Ohio River Mainstem Systems Study (ORMSS). As outlined on pages 2-1 and 2-2, the final ORMSS is scheduled for completion within 24 to 36 months. The breakout of this Interim Report, along with anticipated other interim reports for potential projects to be submitted with a 20 year time frame, points out the need, as originally noted by the Corps, for a long-term needs report identified as the ORMSS. Additionally the USFWS Draft Fish and Wildlife Coordination Act Report Appendix A at (p. vi) notes the development an Ohio River Ecosystem Restoration Project Partnership program. These cumulative actions have the capability of affecting the natural resources of the Ohio River Mainstem in a systemic and cumulative fashion. The National Environmental Policy Act specifically calls for consideration of systemic and cumulative effects to be considered when such projects are part of a system of actions that together may impact upon a resource. This Interim Feasibility Report fails to satisfy NEPA in this regard, considering the stated ongoing interim investigations at other locks and dams on the Ohio River Mainstem.

Further, regarding the failure in this report to consider cumulative and systemic effects of projects likely to occur on Ohio, the report fails to develop a baseline condition for fish and wildlife resources, necessary to evaluate and compare the "future without project" and "future with project" conditions. As is noted in the final Fish and Wildlife Coordination Act Report dated February 18, 2000, at page 6, there are specific problems with the Corps advancing Interim Reports in the absence of baseline information. Both the Environmental Impact Statement and Draft FWCA Report note the changes wrought on the Ohio due to installation, operation and maintenance and improvements of the Lock and Dam system on the River and the degradation it has made to the natural resource baseline. Advancing this Interim Report fails to satisfy NEPA requirements for establishing adequate baselines prior to development of mitigation plans.

It is noted in reviewing the Interim Project Report and the DEIS bibliography, that the Report fails to consider ongoing Operations and Maintenance of the navigation system of the Ohio River. The last noted EIS for such work "US Army Corps of Engineers, Final Environmental Impact Statement, Ohio River Navigation Project Operation and Maintenance" is dated 1980. Operations and maintenance are noted by the USFWS as having impacts on the natural resources of the river and the failure to provide a timely and recent review and mitigation of such activities is a violation of NEPA. A Supplemental EIS must be prepared whenever "there are significant new circumstances or information relevant to environmental concerns and bearing on the proposed action or its impacts." 40 C. F. R. 1502.9(c). The Corps own regulations also require a Supplemental EIS in such circumstances. 33 C. F. R. 230.13 (b).

The submission of a Interim Feasibility Report to correct supposed deficiencies in the operations and maintenance of the navigation operations of the Ohio River Navigation System in the absence of a similar series of Feasibility Reports concerning the operation and maintenance of the natural resources of the Ohio River would seem to violate the tenets and prescriptions of the Corps' mission. The Water Resources Development Act of 1990 establishes "environmental protection as one of the *primary* missions of the Corps of Engineers in planning, designing, constructing, *operating, and maintaining* water resource projects. 33 U. S. C. 2316 (a) (emphasis added)

Finally the Sierra Club has significant concerns related to the economic justification of the proposed project. While our deadline for submitting comments on the Interim Report prior to its submittal to Headquarters does not allow us sufficient time to detail our concerns in this area, we will submit a detailed review to the Assistant Secretary for Civil Works and to the District as soon as possible.

In short however the Club notes that the entire justification for submission of the Feasibility Report is ostensibly for eliminating delay times caused by scheduled and unscheduled shutdowns of the main 1200-foot locks at these two facilities. We find it hard to consider that the economic justification for these projects is equivalent to building two bridges at some one location to have the second one available for those times when the first bridge operations are under maintenance. Taxpayers and legislators have not supported such justifications in our nation's highway system operations and we do not believe they are justified on the Inland Waterway System. Especially when a single commodity, coal, comprises 54 to 65 percent of the identified traffic at the two locks, the singling out of one particular industry for benefits is not a proper use of the National Economic Development Planning process. We will detail our discussions in a follow-up report.

The Sierra Club believes that this Interim Feasibility Report is insufficient in its economic justification, and insufficient in its requirements under the existing responsibilities of the US Army Corps of Engineers towards protecting the natural resources of the Ohio River. We request the District to delay submission of this report pending reconsideration of these environmental responsibilities, and we submit that the proper forum for advancing such projects as outlined in the Interim Report belongs in a single submission of the Ohio Mainstem Study, encompassing all considered navigation and environmental improvements, and encompassing consideration of Ohio River Navigation and Environmental Resources Operations and Maintenance to meet the dual responsibilities of the Corps to the Nation.

Mark N. Beorkrem

Mark N. Beorkrem
Navigation Policy Specialist
Mississippi River Protection Project
P. O. Box 370
204 N. Wyandotte St.
Morrisonville, IL 62546
217-526-4480
email: mbeorkrem2@hotmail.com

cc: Carl Zichella
Midwest Regional Staff Director
Sierra Club Midwest Region
214 N. Henry, 2nd Floor
Madison, WI 53703

The Honorable Joseph W. Westphal
Assistant Secretary of the Army (Civil Works)
Room 2E570
The Army Pentagon
Washington, D. C. 20310-0108

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mark N. Beorkrem
Navigation Policy Specialist
Mississippi River Protection Project
P.O. Box 370
204 Wyandotte Street
Morrisonvill, IL 62546

Dear Mr. Beorkrem:

This is in response to your 16 March 2000 letter providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement (DEIS).

We appreciate the Sierra Clubs interest in the current feasibility studies. As required, the Draft Fish and Wildlife Coordination Act Report was included as Appendix A in the DEIS received by you on 28 February 2000. Also, the February 18, 2000 comment letter from the US Fish & Wildlife Service is included in Appendix K of the Final Environmental Impact Statement (FEIS). I trust this information is helpful in your continuing involvement.

With respect to the Greenup and J.T. Myers reports, it is important to reaffirm these are interim reports identified during the Ohio River Mainstem System Study (ORMSS). The need for accelerating these two projects was due to the high costs associated with delays during closure of main chambers at the project sites. Recommendation of these projects for authorization at this time does not affect decisions on the need for or justification of any future major navigation projects on the mainstem Ohio River. Neither do these two projects depend on any other potential major navigation improvements along the mainstem for their justification. Their economic and navigation benefits are unique to the structural reliability of each project. Further, a large proportion of their constituent traffic is of a local nature. Each is individually justified on its own benefits and is independent of other possible future major navigation improvements in terms of their utility and benefits. The environmental impacts of these projects have also been found to be largely local. The extent and influence of limited site-specific impacts associated with the proposed enhancements make consideration of these projects reasonable in their own context.

Section IV of the FEIS addresses cumulative impacts of proposed actions at the J.T. Myers and Greenup Locks and Dams (Greenup L&D). The Corps of Engineers understands that the Ohio River supports a continuum of resources along its length. We also agree with the importance of addressing system-wide cumulative impacts which could result from the combination of all major navigation improvements. This will certainly become an issue of great concern as we explore options which may impact system-wide resources during the course of the ORMSS. The Corps has stepped through the process as outlined by CEQ and EPA and determined that exhaustive cumulative impact assessments for Ohio River resources was not appropriate for decisions on the two proposed projects. It appears likely, at this time, that future ORMSS documents will include both Master Plan and feasibility level authorization reports. Such a planning effort would require the system-wide perspective cited in your comments as actions would affect system-wide resources.

Nevertheless, the Corps of Engineers concurs in the need for a baseline against which to compare predictions for the future Without-Project and future With-Project conditions. Section IV of the FEIS includes these baseline conditions of the resource.

Consideration of ongoing operation and maintenance practices are addressed in the FEIS cited in your comment letter. The operations and maintenance issues, and the concomitant environmental effects of the existing navigation system are outside the scope of this study. The current planning effort does not materially affect the future operation and maintenance of the L&Ds or the navigation system as a whole. The ORMSS is considering "whether any modification in the authorized plan for modern barge navigation and other purposes on the Ohio River is advisable at this time..." (Resolution, HR Committee on Public Works and Transportation, March 11, 1982). The proposed navigation improvements relate to decisions on the merits of accommodating commercial navigation traffic during foreseeable maintenance outages at J.T. Myers and Greenup L&D. The intent of this study is to address navigation needs. The resources impacted by the proposed action are largely isolated to the vicinity of the L&Ds themselves. Future operation and maintenance practices would remain unchanged in the With and Without project conditions.

The economic models used in the current study do not project traffic increases as a result of the proposed navigation improvements. Although the justification for lock extensions is based primarily upon reducing delays during main chamber closures, having two 1200' chambers would also reduce delays during normal operations. These benefits are included in our analysis. Please note that most of the delay costs projected into the future are associated primarily with closures of the main chamber as well as the auxiliary chamber. Alleviating the closure disruptions/delays by extending the auxiliary chamber allows us to reduce these closure costs. The lock extension would not eliminate delays during closures of the main chamber. Having the auxiliary capacity of a single 1200' chamber substantially lessens delays at such times, but it does not have sufficient capacity to handle all expected traffic without some delay. Our analyses still do not reveal project-related increases in traffic on the river. See Sections 12 and 15 (particularly Tables 12-1 and 15-1) of the Main Report for information on economic analyses.

The analogy of auxiliary highway bridge facilities does not fit the situation at J.T. Myers and Greenup L&Ds. The auxiliary chamber allows the lock facility to function more efficiently during any kind of service interruption to the main chamber. While it is true that coal is the predominant commodity at these two projects and on the Ohio River mainstem in general, the coal industry is not the only industry or entity to benefit. Coal shipments are paid for primarily by the electric utility industry, an industry that in turn touches and benefits the lives of everyone where they work, shop and live. The coal mining and electric utility industries benefit from waterway investments, but it is important to remember that 46% (34.1 million tons) of J.T. Myers traffic and 35% (24.7 million tons) of Greenup traffic directly benefits a number of other industries. This list of industries includes farming, food processing, forestry, paper, steel, household appliances, construction material, chemical and petroleum.

The Corps appreciates your continued interest in the Ohio River Mainstem System Study. The Sierra Club's contribution to this process has been productive and timely. We thank you for these contributions.

Sincerely,

Veronica Rife

Veronica L. Rife, P.E.
Project Manager

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

REPLY TO THE ATTENTION OF

FEB 29 2000

B-19J

Ms. Veronica Rife
Attn: PM-C
Department of the Army
Army Corps of Engineers, Louisville District
Post Office Box 59
Louisville, Kentucky 40201

RE: Draft Interim Feasibility Report and Environmental Impact Statement for J. T. Myers and Greenup Locks Improvements, **EIS no. 000000**

Dear Ms. Rife:

In accordance with our responsibilities under the National Environmental Policy Act (NEPA) and Section 309 of the Clean Air Act, the United States Environmental Protection Agency, (U.S. EPA) has reviewed the Interim Feasibility Report for the J.T. Myers and Greenup Locks Improvements Draft Environmental Impact Statement (DEIS) prepared by the United States Army Corps of Engineers, Louisville District. The basis for the Federal action is the understanding that the commercial navigation traffic congestion that occurs during periodic maintenance at these two locks needs to be alleviated. The proposed actions would consist of extending the auxiliary lock chambers from 600 to 1200 feet, changes in fill and empty systems, installing a Miter Gate Quick Change-out System, dredge/disposal, and excavation activities.

Based on the review of the information provided in the DEIS, we have rated the document an "EO-2". The "EO" indicates that we have environmental objections to the proposed project. The "2" indicates that additional information needs to be provided to support the impact analysis documented in the DEIS. This rating will be published in the Federal Register. Our objections are based on the following comments. These comments center on purpose and need, phased approach to NEPA compliance, cumulative impact analysis, mitigation, and sediment analysis.

Your agency has made a determination that there is a need to alleviate the commercial navigation traffic congestion at the Greenup and Myers Locks and Dams during periodic maintenance. The preferred plan consists of the auxiliary lock chambers being extended from 600 to 1200 feet. However, it is not clear if the use of the auxiliary chambers would be strictly limited to maintenance outage periods. As we understand it, the benefit cost analysis conducted for this project identifies additional benefits when the expanded auxiliary lock is projected to be used during non-maintenance related congested periods. If this is the case, and if the Corps plans to allow for this type of use, the preferred plan represents an advancement of the navigation capacity. Further it appears that this use has not been fully evaluated in the DEIS. If this in fact

is the case, the environmental analysis in the DEIS does not accurately articulate the operational impacts that would be associated with the lock expansions.

The purpose and need statement for this DEIS and subsequent analysis needs to clearly reflect the actual future operations so that all the associated impacts are identified and evaluated. In addition, further discussion is needed to explain how the future traffic projections were determined. The U.S. EPA is concerned because the analysis provided in the DEIS does not seem to take into account that traffic volumes system wide have remained constant or decreased for the last three years, which was also reported in the DEIS. In addition, the need to pursue nonstructural options, e.g., congestion fees, should not be peremptorily dismissed without full consideration, because implementation may be difficult. Since lock/dam upgrades along the Ohio River Main Stem (ORMS) are being pursued in phases rather than simultaneously, administrative measures which could be used prior to structural measures, should be considered.

U.S. EPA has serious concerns about the apparent approach to institutionalize a process whereby additional "interim" navigation projects will receive NEPA evaluation as the completion of the ORMS study is recurrently pushed into the future. Procedurally this tact would be contrary to the Council on Environmental Quality(CEQ) Regulations regarding the fragmentation of a large project of this nature. Moreover, the commitment of financial and other important resources attendant to constructing these "interim" measures may inappropriately influence the overall decision-making for the ORMS study. This issue could easily be resolved by the Great Lakes and Ohio River Division (Louisville District) via a definitive commitment in the ROD for the final EIS that additional feasibility studies will be deferred until completion of the ORMS study.

The CEQ defines cumulative impacts as "*The impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions" (40 CFR § 1508.7*). Therefore, we disagree with the statement on page 7 of the DEIS, that the operation and maintenance activities are beyond the scope of analysis. The preferred plan evaluated in the DEIS has both direct and indirect consequences on the long-term health of the system's natural environment. While many impacts may be considered minor, the cumulative effect would potentially result in significant impacts. The completion of an appropriate cumulative impact analysis will promote the need for mitigation to be identified, developed, and implemented at a system wide level. This approach would be similar to the approach that has been taken to manage navigational needs on the ORMS. A system wide approach to provide mitigation to compensate for the loss of natural resources may also allow for improvements rather than simply offsetting losses caused by navigational impacts. Given ORMS's size/complexity, we understand that making even a generic determination about overall anthropogenic effects will not be easy. Further, all navigation upgrades/refurbishment cannot be held indefinitely in abeyance. The significance of not knowing the impacts on this scale further support the commitment that is need by your agency to make this the last action of this nature until the ORMS study is completed.

In general, the proposed mitigation measures for direct impacts appear to be well-founded and their success seems reasonable to predict. However, given that the excavation components of the project approaches landscape dimensions, control erosion and sedimentation will be problematic. It has been our experience that the concept of precluding undesired soil movement and its execution are two different matters. We recommend that the specific measures which will be used to control soil movement (especially turbidity in receiving waters) from construction activities be referenced in the project's Record of Decision (ROD). Additionally, these measures/techniques should also be listed in the construction contract with significant penalties for nonperformance together with third-party monitoring of same. If these stipulations are instituted, they will subsume the need and expense of quantitatively modeling sedimentation impacts.

Finally, the DEIS did not provide a sufficient discussion on the quality of the sediment that would be removed with implementation of the preferred plans. The DEIS made general statements that there should not be any contamination present. However, the document did not provide any type of supporting data or in depth discussion. The Final Environmental Impact Statement needs to further discuss this issue in more detail. The discussion should include such information as historical activities, sediment type, and the contaminant analysis that was done. Included in this discussion, if needed, the methods of sediment removal and disposal, and the effects to water quality.

Thank you for the opportunity to review and provide comments on the DEIS. We are willing to discuss our comments at your convenience. If you have any comments or questions, please contact Al Fenedick at 312 886-6872 or by email at fenedick.al@epa.gov.

Sincerely,

Shirley Mitchell

Shirley Mitchell, Deputy Director
Office of Strategic Environmental Analysis

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Ms. Shirley Mitchell
Deputy Director
Office of Strategic Environmental Analysis
United States Environmental Protection Agency
Region 5
77 West Jackson Boulevard
Chicago, Illinois 60604-3590

Dear Ms. Mitchell:

This is in response to your 29 February 2000 letter providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement (Reference B-19J).

Regarding use of auxiliary chambers, the auxiliary chamber will be used whenever it is advantageous to the carriers and the lockmaster, therefore we assume in our economic analysis that both chambers will be used during normal operations. This does represent an increase in capacity at the two projects. This increased capacity is derived from the extended auxiliary chamber. Current economic projections suggest that the future navigation traffic would benefit from this additional capacity primarily during periodic closure of the main chamber. Projections of future demand on the system indicate that additional capacity at the subject locks & dams would not induce traffic growth. The added capacity of the auxiliary chamber is needed only during outages of the main chambers. Economic analysis of this project assumes that traffic will continue to grow as projected under the With and Without Project condition. This has been clarified in Section 8 of the Main Report.

Section 6 and Attachment 3 of the Economics Appendix describe the methodology used to forecast future traffic levels. Traffic fluctuates from year-to-year. Droughts, floods, strikes, civil unrest, fires, accidents, wars, recessions and a host of short-term events can and do disrupt yearly flows; however, the overall 50 year waterway traffic trend has been decidedly upward. Between 1950 and 1998 Ohio River System traffic grew from 37.3 million tons to 278.0 million tons, between 1988 and 1998 system traffic grew by 48.7 million tons, and between 1995 and 1998 Ohio River System traffic grew 14.5 million tons.

As stated in FEIS Section 1.2, other than frequency and duration of maintenance outages, no other operational changes are planned. Detailed discussion is provided in Section 8 of the Main Report and the Economics Appendix and is incorporated by reference. A number of nonstructural measures have been considered and evaluated. Two nonstructural measures, re-scheduling shipments and helper boat operations, are included as part of the without project condition, against which the performance of all with project alternatives are assessed. Congestion fees were considered as an alternative to a structural solution. While it is true that implementation would be an extremely difficult challenge, an economic analysis was conducted and presented in the Economics Appendix to the Main Report. That analysis indicated that a fee program has positive benefits, but because it does not address the problem directly, it has much smaller benefits than a lock extension.

The Greenup and J.T. Myers reports are interim reports identified for individual treatment during the ORMSS. This approach was discussed in the Notice of Intent published in the Federal Register Notice on October 28, 1998. The need for accelerating these two projects was due to the high costs associated

with delays during closure of main chambers at the projects. Recommendation of these projects for authorization at this time does not affect decisions on the need for or justification of any future major navigation projects on the mainstem Ohio River. Neither do these two projects depend on each other or any other potential major navigation improvements along the mainstem for their justification. Their economic and navigation benefits are unique to the structural and reliability disposition of each project. Further, a large proportion of their constituent traffic is of a local nature. Each is individually justified on its own benefits and is independent of other possible future major navigation improvements in terms of their utility and benefits. The environmental impacts of these projects have also been found to be largely local. The extent and influence of limited site-specific impacts associated with the proposed enhancements make consideration of these projects reasonable in their own context.

Section IV of the FEIS addresses cumulative impacts of proposed actions at the J.T. Myers and Greenup Locks and Dams. The impacts of continued operation and maintenance of the Ohio River Navigation system have already been addressed in the *Ohio River Navigation Project Operation and Maintenance FEIS*, 1980. The Corps of Engineers understands that the Ohio River supports a continuum of resources along its length. We also agree with the importance of addressing system-wide cumulative impacts which could result from the combination of all major navigation improvements. This will certainly become an issue of great concern as we explore options which may impact system-wide resources during the course of the ORMSS. Therefore, we are committed to performing an assessment of system-wide cumulative effects on resources along the river corridor in the next report dealing with major navigation improvements on the mainstem. We are currently revising the study plan with emphasis on completing the Master Plan in the next report on major navigation improvements under the ORMSS. It appears likely at this time, that the document will include both a Master Plan and feasibility level authorized reports. Regardless of the direction of the next report, the Corps of Engineers will include appropriate studies to assess past, present, and reasonably foreseeable future actions by the Corps of Engineers and others.

Measures that would be incorporated in project plans are generally described in Table 8-2 of the FEIS. Details of more specific measures that will be taken to control soil movement have yet to be developed. However, as we move towards project construction, we will identify Best Management Practices in project specifications. We will also require the construction contractor to develop and submit for approval an Environmental Protection Plan that details installation, maintenance, and monitoring requirements. Also, monitoring needs identified in Section 8.4 of the FEIS include monitoring of soil movements. Finally, construction at these sites will require NPDES stormwater permits to be obtained by the contractor(s). These precautions are believed to be adequate to ensure soil movements are controlled and offsite impacts are minimized. The Record of Decision will reference that measures are included in the projects to control soil movements rather than provide detailed descriptions of specific measures.

A Phase I A assessment was performed in conjunction with the reconnaissance study for the J.T. Myers project in late 1993 to 1994. Based on the Phase I A assessment, the sediments were considered the only earthen materials with a reasonable probability of chemical contamination. Chemical testing of sediments around the existing lock and dam is performed on a periodic basis in conjunction with maintenance dredging. This testing has not revealed significant sediment contamination. However, the Corps of Engineers proposes to implement a thorough chemical-testing program during the summer of 2000 or 2001. The Indiana Department of Environmental Management (IDEM) is currently reviewing the Quality Assurance Project Plan (QAPP), which describes the proposed sediment testing. Section 3.3.3.2.1 of the FEIS discusses this issue in more detail. The discussion includes a summary of historical activities, testing procedures, methods of sediment removal and disposal, and the effects to water quality. Alternative sediment disposal methods and locations are also discussed.

Thank you for your comments and interest in the Ohio River Mainstem System Study.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

DNR Indiana Department of Natural Resources

Frank O'Bannon, Governor
Larry D. Macklin, Director

Division of Historic Preservation and Archaeology
402 W. Washington Street, W274
Indianapolis, IN 46204-2748
PH: 317/232-1646
FAX: 317/232-0693
dhpa@dnr.state.in.us

April 28, 2000

Ms. Jan Marie Hemberger
Planning Division
Economics and Environmental Resources Branch
Department of the Army
U.S. Army Engineer District, Louisville
Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Federal Agency: U.S. Army Corps of Engineers ("ACOE")

Re: Geomorphological investigations at the John T. Meyers Locks and Dam (Contract DACW27-97-D-0003).

Dear Ms. Hemberger:

Pursuant to the National Historic Preservation Act (16 U.S.C. 470 et seq. and 36 C.F.R. Part 800) the Indiana Department of Natural Resources, Division of Historic Preservation and Archaeology ("DHPA") has conducted an analysis of the above indicated project and archaeological report submitted to our office regarding the above project in Posey County, Indiana, for the ACOE.

Based upon the documentation available at DHPA, we have not identified any historic buildings, structures, districts, or objects listed in or eligible for inclusion in the National Register within the probable area of potential effects.

In regard to the subsurface findings, we concur with the findings of the report. Therefore, no known **buried** archaeological sites listed on or eligible for the National Register of Historic Places will be affected by this project. However, there appears to be one surface archaeological site (12Po802) reported within or adjacent to the project area (see enclosure). If this site is in the project area, and cannot be avoided by project activities, an archaeological surface reconnaissance of this location is necessary.

If any archaeological artifacts dating before December 11, 1816 or human remains dating before 1940 are uncovered during construction, demolition, or earthmoving activities, state law (Indiana Code 14-21-1-27 and 29) requires that the discovery be reported to the Division of Historic Preservation and Archaeology within two (2) business days. Additionally, in the event that artifacts or features are discovered during the implementation of the federally assisted project, activity, or program and a plan with such discoveries has not been developed, it is the federal agency's responsibility to contact the Advisory Council of Historic Preservation in accordance with 36 C.F.R. Section 800.11 (b)(2).

This correspondence is meant to assist the ACOE in its identification of historic resources and determination regarding the project's effect on historic resources (36 C.F.R. Part 800.4).

If you have any further questions, please contact our office at (317) 232-1646.

Very truly yours,

for Larry D. Macklin
State Historic Preservation Officer

LDM:RJ:jj

Enclosure

DEPARTMENT OF THE ARMY
U.S. ARMY ENGINEER DISTRICT, LOUISVILLE
CORPS OF ENGINEERS
P.O. BOX 59
LOUISVILLE, KENTUCKY 40201-0059

May 5, 2000

Civil Project Management Branch

Mr. Larry D. Macklin
Director
Indiana Department of Natural Resources
402 West Washington Street, Room W-256
Indianapolis, IN 46204

Dear Mr. Macklin:

This is in response to your 28 April letter providing comments on the "Interim Feasibility Report: J.T. Myers and Greenup Locks Improvements, Indiana, Kentucky and Ohio, Document MR: DRAFT Main Report and DRAFT Environmental Impact Statement.

Every attempt will be made to avoid impacts to cultural resources discovered on or near the project site. An archaeological surface reconnaissance would be conducted if archaeological site 12Po802 were determined to be within the construction work limits of the project area. This surface study would be completed in accordance with applicable laws and regulations. In addition, discovery of archaeological artifacts during construction, demolition, or earthmoving activities would be reported to the Division of Historic Preservation and Archaeology in accordance with Indiana State law.

Thank you for your comments on the Report and DEIS. Your continued interest and participation in the Ohio River Mainstem System Study is appreciated.

Sincerely,

Veronica L. Rife, P.E.
Project Manager

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION
West Virginia Public Port Authority
1900 Kanawha Boulevard East • Building Five • Room 512
Charleston, West Virginia 25305-0430 • 304/558-0330

Cecil H. Underwood
Governor

Samuel G. Bonasso, P.E.
Secretary

Wilfred A. Jackson, A.A.E.
Executive Director

February 7, 2000

Colonel Robert Slockbower
Louisville District Engineer
c/o Veronica Rife, Project Manager
Louisville District, U.S. Army Corps of Engineer
PO Box 59
ATTN: PM-C
Louisville, KY 40201-0059

Dear Colonel Slockbower:

This letter is intended to convey the wholehearted support of the West Virginia Department of Transportation and the West Virginia Public Port Authority (WVPPA) for the construction of additional capacity at the John T. Myers and Greenup Locks and Dams. Both of these Ohio River structures are vital to the transportation needs of every state located along the Ohio and Mississippi estuary system.

River transportation is essential to the economic vitality of the United States as a whole and particularly to the industries requiring bulk commodity moves. The present undersized lock chambers at the John T. Myers and Greenup Locks and Dams are woefully inadequate and must be enlarged in order to accommodate present demand and future growth. Any delay in these crucial projects renders our country less competitive on the world scale. Decisive actions must be immediately taken to correct these shortcomings!

West Virginia is a strong supporter of a vastly improved river navigation system and these locks and dams are the obvious places to begin.

Sincerely,

Wilfred A. Jackson, A.A.E.
Executive Director

cc: DINAMO
WVPPA Members
Gus Drum, COE, Huntington District

West Virginia Public Port Authority
Comment Response

No response required.

VIGO COUNTY
Soil and Water Conservation District

ESTABLISHED JANUARY 23, 1950

HONEY CREEK WEST—3241 SOUTH 3RD PLACE
TERRE HAUTE, INDIANA 47802-5252
TELEPHONE (812) 232-0193 EXT. 3 • FAX (812) 234-9629

T BY 2000 SAVING SOIL

To: Veronica Rife, Project Manager
U.S. Army Engineer District, Louisville
P.O. Box 59 ATTN:PM-C
Louisville, KY 40201-0059

From: Lloyd Lenderman, Chairman
Vigo County Soil & Water Conservation District
Vigo County, Indiana

Subject: Interim Feasibility Report: J.T. Myers & Greenup Locks Improvements

Our office received a copy of a "Notice of Availability" for the above mentioned feasibility report. Included in the notice was a call for comments. Although I have not seen the feasibility report itself, I wanted to take this opportunity to inform you that the Vigo Co. SWCD is in support of any improvements to the Ohio River navigation system.

Improving the system that in turn sustains the movement of agricultural products is of vital importance to our nations agricultural economy. An improved ability to move these products directly relates to increased profits for farmers. Increased profits means more money available to invest in conservation of our nations most precious resources , soil and water.

Again, let me say that we are wholeheartedly behind any such improvements.

Sincerely,

Lloyd Lenderman

Lloyd Lenderman
Chairman, Vigo Co. SWCD

Vigo County Soil & Water Conservation District
Comment Response

No response required.

Midland
Eastern Enterprises

Midland Enterprises Inc.
300 Pike Street
Cincinnati, OH 45202-4222
Tel: 513-721-4000
Fax: 1-800-950-2080

J. Mark Cook
President

February 15, 2000

Colonel Robert Slockbower
Louisville District Engineer
c/o Veronica Rife, Project Manager
U.S. Army Corps of Engineers District, Louisville
P.O. Box 59
Louisville, Kentucky 40201-0059
Attn: PM-C

Re: Construction of Additional Capacity at the John T. Myers and Greenup Locks and Dams, Ohio River

Dear Colonel Slockbower,

I am the President Midland Enterprises and its subsidiary, The Ohio River Company. We are one of the largest inland river transportation companies operating barges and towboats on the Ohio River and its tributaries. Our vessels carry various commodities including coal, steel and scrap, HBI/DRI for mini-mills, grain, alumina, logs, sand and gravel on the river system Jones Act trade.

As one of the largest members of the inland waterway industry, we are keenly interested in the progress of construction of additional capacity at the John T Myers Lock and Dam, Ohio River Mile 846 and the Greenup Lock and Dam located at Ohio River Mile 341. In excess of 70,000,000 tons of cargo transit through *each* of these facilities annually, creating significant economic value in terms of jobs, tax revenue and maintaining low cost availability of electricity, food products, construction materials and other products transported in barges.

The structure in place at Greenup lock was constructed in 1959 and the John T. Myers facilities date to 1975. The main chambers at each lock are at their practical capacity at this point in the year 2000. As the requirements for maintenance and repair grow, the resulting negative economic impact on the products that are delayed by lock outages is significant. For example, in 1989, some eleven years ago, a 45-day closure for maintenance at Myers resulted in an average daily delay of 4 days per tow or real dollar costs of $15,000,000. Barging is a very low cost method of transportation, responsible for moving more than 15% of all of the United States total freight for less than 2% of the nations total transportation costs, which translates into savings for the consumer, such as lower rates for electricity, food and food products, and many other agricultural and industrial items. It is imperative that capital improvements of our lock and dam structures move forward to ensure that the economics are fully captured for industry and consumers alike.

Midland Enterprises supports and recommends full and adequate appropriation of funds for operation and maintenance of the lock and dam system on our inland waterways. We are very concerned that adequate funding for construction and maintenance be available to permit the Corps of Engineers to proceed with some of the projects that have been deferred over the past three years. Funding of these projects is necessary to assure that the Inland Waterway System remain a vibrant and low cost mode of transportation for our country. Midland strongly supports the U.S. Army Corps of Engineers, Louisville and Huntington District's in their recommendations for construction of additional capacity at the John T. Myers and Greenup Locks and Dams. Installation of an additional length of 600' to the auxiliary chamber of each of these two locks will greatly reduce the congestion experienced by barge traffic on a regular basis and ensure that these facilities will be prepared to handle the projected tonnage growth over the next twenty years.

The Ohio River Basin, including the Myers and Greenup locks and dams, is home to 25 million people and carries approximately 260,000,000 tons of commodities in barges on its navigable tributaries. These commodities are the products of the daily work of the residents and result in usable goods consumed by a significant portion of the U.S. population. Improvements and upgrades in our lock and dam system, supported by industry cost-sharing on a 50/50 basis via the Inland Waterways Trust Fund, are the only way to ensure that the United States receives the greatest economic benefit from our great river system. Midland Enterprises Inc. appreciates the industry-government partnership that exists with the Corps of Engineers. We are available to work with you in any way to champion these projects through the approval and appropriations process to a successful implementation.

Very truly yours,

J. Mark Cook

cc: Mr. Barry Palmer, DINAMO

Midland

Midland Eastern Enterprises
Comment Response

No response required.

Peter H. Stephaich
Chairman and CEO

Blue Danube Incorporated

Three Mellon Bank Center, Suite 3901
525 William Penn Place
Pittsburgh, PA 15219-1709

Tel. (412) 338-6606
Fax (412) 338-6609

February 12, 2000

Colonel Robert Slockbower
Louisville District Engineer
C/o Veronica Rife, Project Manager
U.S. Army Corps of Engineer District
Louisville, P.O. Box 59
Louisville, KY 40201-0059
Attn: PM-C

Ref: John T. Meyers and Greenup Lock Extentions

Dear Colonel Slockbower:

Blue Danube Incorporated is a privately held, Pittsburgh based holding company that owns three operating subsidiaries, which are engaged in the river transportation industry. We employ about 450 employees and we run boats the entire length of the Ohio River. Campbell Transportation and Kanawha River Towing are the two divisions that run boats on the Ohio.

These two projects are very important to us so that our boats are not delayed, which costs us valuable time. A second and less obvious reason for proceeding with these lock extensions is the fact that a majority of the cargo, which either goes to or comes from Pittsburgh, transits though these locks. Delays downriver add costs and delays to cargo that transits in our port. We must be proactive and increase the capacity of the Middle Ohio River locks to twin 1200' chambers.

Sincerely yours,

Peter H. Stephaich

Cc: DINAMO

Blue Danube Incorporated
Comment Response

No response required.

FirstEnergy
Comment Response

No response required.

FirstEnergy

76 South Main Street
Akron, Ohio 44308

Guy L. Pipitone
Vice President

330-384-5799
Fax: 330-384-5669

February 9, 2000

Colonel Robert Slockbower
Louisville District Engineer
c/o Veronica Rife, Project Manager
U. S. Army Corps of Engineer District
Louisville, P. O. Box 59
ATTN: PM-C Louisville, KY 40201-0059

Dear Colonel Slockbower:

We are in support of the U.S. Army Corps of Engineers' recommendation for the upgrade and capacity addition of the Ohio River John T. Myers and Greenup Locks.

The traffic at each lock chamber is approaching their practical capacity and any closing of the locks rapidly leads to major traffic delays, costing the economy and consumers many millions of dollars.

Please add FirstEnergy to the list of those in agreement with the recommendations of the Corps.

Very truly yours,

G. L. Pipitone

drd

cc: MJDowling

Gateway to the Industrial Ohio Valley

MT. VERNON BARGE SERVICE, INC.

MT. VERNON FLEETING SERVICE, INC.

Fleeting • Cleaning • Drydock • Stevedores • Warehousing

February 10, 2000

Colonel Robert Slockbower
Louisville District Engineer

Dear Sir,

Mt. Vernon Barge Service is very familiar with the costly delays at John T. Myers Lock and Dam.

We wholeheartedly agree with the Corps recommendation to extend the 600-ft. locks at John T. Myers and Greenup. Also the installation of the Miter Gate Quick Changeout System.

We also concur with the additional decision in the Intrem Feasibility Report recommending major rehabilitation of the main lock chamber at the Greenup Lock.

It is our hope that these projects can move forward in a timely fashion.

Sincerely,

Arthur W. Bayer, Jr.

Arthur W. Bayer, Jr.

Mt. Vernon Area Chamber of Commerce
Comment Response

No response required.

THE PROPELLER CLUB OF THE UNITED STATES
PORT OF EVANSVILLE, INDIANA - PORT 164

To Promote, Further and Support the American Merchant Marine.

To Aid Development of the Great Lakes, Inland Rivers and Harbor Improvements.

February 10, 2000

Colonel Robert Slockbower
Louisville District Engineer
c/o Veronica Rife, Project Manager
U.S. Army Corps of Engineers District
Louisville, P.O. Box 59
ATTN: PM-C, Louisville, KY 40201-0059

Dear Colonel Slockbower,

It is our understanding that the Louisville District, U.S. Army Corps of Engineers is in the process of making certain recommendations for construction to improve barge and vessel traffic capacity through the John T. Meyers and Greenup Locks and Dams on the Ohio River. These improvements may be summarized as follows.

- Extending the shorter 600' lock (the land-side chamber) to 1,200' length. (These are nominal dimensions, i.e. a 1,200' chamber means that a 1,200-foot long tow can be accommodated in the chamber.)
- Installation of a Miter Gate Quick Changeout System which provides for significantly faster repairs to the lock gates in the future at these two sites whenever gate repairs are required.

The Port of Evansville Propeller Club is an affiliate member of The Propeller Club of the United States, an industrial maritime organization dedicated to the promotion and well being of the American Merchant Marine trade and service. As such, we as a club representing in excess of 100 members from some 58 companies from New Albany to Mt. Vernon on the Indiana side and from Louisville to Henderson on the Kentucky side of the Ohio River wish to express our wholehearted support of the recommendations to improve efficiency and thruput at these two (2) Dams and Locks. Attached you will find a listing of companies represented in the Port of Evansville Club.

Should you wish further information or have any questions, do not hesitate to contact the undersigned.

Yours truly,

Jack Cunningham
President-Port of Evansville

cc: Art Bayer-Mt. Vernon Barge and Marine
Barry Palmer-DINAMO

The Propeller Club of the United States
Port of Evansville - No. 164

Companies Represented by Membership
Membership Year 1999-2000

Marine Industries Corporation
Timco Industries Inc.
Corn Island Shipyard, Inc.
Elmer Buchta Trucking
Mulzer Crushed Stone
Country Mark Cooperative
Casino Aztar Marine Division
American Enviro-Services
Foertsch Construction Co., Inc.
Mount Vernon Barge & Marine
Ashworth Excavating Inc.
Crane and Machine
Southwind Maritime
Specialty Diving Inc.
Paragon Marine
Airgas Corp.
AK Steel
Brandeis Const. & Mine Equip.
ACT Port of Evansville
Wilhite & Associates
Sigcorp Fuels, Inc.
R & R Consulting
Bulldog Diving, Inc.
Lincolnland Economic Development
Old National Bank
Altstadt Office City
Weld-Rite Supply
United Fidelity Bank
Southwind Construction
Cummins Cumberland, Inc.
Floyd I. Staub, Inc.
Morley & Associates, Inc.
ADM/Growmark
Rudd Equipment

Indiana State Port Commission
Data Business Group
Action Steel
Evansville Marine
Crane Const. & Excavating, Inc.
Great Lakes Power
Vernon Corporation
Naas Kerney & Associates
Davis Rentals, Inc.
Elliotts at Marina Pointe
INDOT
Gem Craft Jewelers Corp.
Inland Marina, Inc.
Hamlin Rental
Gabe's Oil, Inc.
Concrete Supply LLC
Ludwig Crane Services
Grove Law Office
Evansville Materials
Liter's Quarry, Inc.
Yager Materials, Inc.
Daviess Co. Sand & Gravel
CMC-Brambles
Construction Machinery Corp.
Southern Shores Terminal, Inc.
Clarke Detroit Diesel/Allison Inc.
Ohio Valley Marine Service
Ohio River Company
Ohio Valley Region - C E I
River City Industrial Services
Whayne Supply Company
Trunnel Scrap Metals
Owensboro Harbour Service
Neace & Associates Ins. Agency

Propeller Club of the US
Port of Evansville, IN – Port 164
Comment Response

No response required.

Mellon Bank
Comment Response

No response required.

Mellon Bank

Mellon Bank Center
Pittsburgh, PA 15259-0001

412/234-5927

February 16, 2000

Colonel Robert Slockbower
Louisville District Engineer
c/o Veronica Rife, Project Manager
U.S. Army Corps of Engineer District
Louisville, P.O. Box 59
ATTN: PM-C, Louisville, KY 40201-0059

Re: Additional Capacity at Myers and Greenup Lock and Dam Sites

As an interested party in promoting cost efficient transportation on the Ohio River System, I am supporting the recommendations of DINAMO (The Association for the Development of Inland Navigation in America's Ohio Valley).

As you are well aware, both locks have seen increased traffic and tows are experiencing costly delays. With the projected traffic growth, the delays will limit our Ohio River System as an economic way to transport bulk commodities in and out of our industrial heartland.

Please use your influence to also support DINAMO's recommendations to construct additional capacity at John T. Myers and Greenup Locks and Dams.

Sincerely,

Robert E. Heuler
Vice President
Director of Natural Resource Lending

cc: DINAMO
Via fax number (412) 392-4520

GREATER
LAWRENCE COUNTY
AREA
LAWRENCE ECONOMIC DEVELOPMENT CORP.
P.O. Box 488
South Point, Ohio 45680-0488
614-894-3838 614-532-9991
FAX 1-614-894-3836

February 15, 2000

Ms. Veronica Rife
CELRL-PM-C
600 Martin Luther King Jr. Place
Louisville, Kentucky 40202

Re: Greenup Locks Dam Project

Dear Ms. Rife:

Enclosed, you will find a Resolution of Support, by order of the Board of County Commissioners of Lawrence County, Ohio regarding the Greenup Locks project.

I trust this resolution will be helpful in obtaining funds from the United States Congress for a very worth while project.

If we may be of further assistance, please do not hesitate to let us know.

With regards,

Pat Clonch
Patricia L. Clonch
Executive Director

/bd

Resolution

by order of the

Board of County Commissioners

LAWRENCE COUNTY, OHIO

Resolution

The County of Lawrence, in the State of Ohio, situate on the beautiful Ohio River in a Statistical Metropolitan Area (MSA) with an MSA population of 350,000 and with the potential to become a moving force in the global economy in the next century due to the very strategic geographic location it occupies; and

Whereas, Lawrence County has resolved to create gainful, full time employment for the residents of the area; and

Whereas, The Chief Elected Officials, i.e. the County Commissioners view the Ohio River as a major corridor of commerce and industrial development with the capacity to move into the major markets as the nation's number one Inland River Port and continue to be a national mode of transportation and, thus, attract additional employers and create new, gainful employment positions for the tri-state labor force; and

Whereas, Lawrence County, Ohio's strategic long term plan of development includes the establishment of a riverfront Industrial Park complete with Port Authority and a Foreign Trade Zone on an Ohio River site that is inherently well equipped to function as a supply route of said Inland River Port; and

Whereas, The Ohio River is a major link with Central America and Canada and major improvements are needed in the 40 year old Greenup Locks and Dam system to assure future case of access to the users of the Greenup Locks that will provide cost effective river transportation and thus attract shippers and waterway users to the area; now

Therefore Be It Resolved, With this resolution of support for the United States Congress to appropriate the funds needed for the Greenup Locks project without further delay.

Bruce E. Trent, President

Paul H. Herrell, Vice President

George R. Patterson, Member
Board of Lawrence County Commissioners
Lawrence County, Ohio

No response required.

OLD NATIONAL BANK
MEMBER OLD NATIONAL BANCORP
P.O. Box 718 • Evansville, IN 47705

STEVEN A. BENNETT
Community Bank President
Mt. Vernon Office
Tel. (812) 838-8000
FAX (812) 838-8007

January 15, 2000

Colonel Robert Slockbower
Louisville District Engineer
c/o Veronica Rife, Project Manager
U. S. Army Corps of Engineers, Louisville District
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Colonel Slockbower:

I had an opportunity to meet you last night at the Mount Vernon High School as you were presenting information regarding the extension of the 600 ft. landside lock chamber at the John T. Myers Lock and Dam. It is my understanding that in addition to this you are installing an improvement to the gate system so that repairs can be made more quickly to the lock gates also at the John T. Myers Lock and Dam.

As I understand it, substantial delays can occur as repairs are being made to the main 1200 ft. chamber at the lock and dam at Uniontown currently known as the John T. Myers Lock and Dam. These delays can have a great impact very quickly on commerce flowing through our community on the Ohio River and, in particular, can have a substantial impact on some of the shippers and receivers of goods here in the Posey County area. I would urge you to encourage support for this particular project as I believe the benefits will be readily noticeable and are immediately needed here in southwest Indiana.

Please contact me if you have any questions. I sincerely appreciate your interest in educating the local community about this important planned expansion. I further appreciate your offer to attend other local community meetings and educate more of the citizens of Posey County about this need.

Sincerely,

Steve Bennett
Community Bank President
Mt. Vernon Office

Old National Bank
Comment Response

No response required.

Jackson L. Higgins, Mayor
City of Mt. Vernon
Comment Response

No response required.

February 14, 2000

US Army Corps of Engineers
Louisville District

COMMENTS TO:
U.S. ARMY CORPS OF ENGINEERS
OHIO RIVER MAINSTEM SYSTEMS STUDY

NOTE: Draft Interim Feasibility Report, J. T. Myers and Greenup Locks Improvements written statements turned in at this meeting or received at the address below by February 29, 2000 will become part of the Ohio River Mainstem Systems Study record and will be given due consideration in completion of the final report.

To Whom It May Concern:

On behalf of the City of Mt.Vernon, I want to express my support of the improvements to the John T. Myers and Greenup Locks and Dam.

These improvements would be beneficial to the Mt.Vernon area in maintaining our access to both domestic and international markets, job creation and the abilities of our local industries to compete for market shares using this most economical form of transportation.

This project will reap long-term benefits which will enhance not only industrial, but also residential well-being.

Sincerely,

Jackson L. Higgins, Mayor
City of Mt.Vernon

JLH:sw

NAME Jackson L. Higgins, Mayor

GROUP/AGENCY City of Mt.Vernon, Indiana

ADDRESS Mt.Vernon STATE IN ZIP 47620

Return by mail to: Veronica Rife, Project Manager
U.S. Army Engineer District, Louisville
P.O. Box 59 Attn: PM-C
Louisville, KY 40201-0059

Mt. Vernon Area Chamber of Commerce

"Serving All of Posey County"

February 21, 2000

Colonel Robert Slockbower
Louisville District Engineer
C/O Veronica Rife, Project Engineer
US Army Corp. of Engineers
P. O. Box 59
ATTN: PM-C, Louisville, KY 40201-0059

Dear Colonel Slockbower:

Much of Mt. Vernon's industry relies on the Ohio River for shipping and receiving commodities and supplies. Transportation delays not only effect these companies bottom line, but adversely impacts the community as well.

Future traffic growth and resulting acceleration of transit costs justify the need for the extension the shorter 600' lock at the John T. Myers Lock and Dam to 1200' in length, plus installation of a Miter Gate Quick Change-out System which provides for significantly faster repairs to the lock gates.

The Board of Directors of the Mt. Vernon Area Chamber of Commerce supports these improvements and encourages their timely completion.

Sincerely,

Nancy L. Burns
Executive Vice President

NLB/djc

P.O. Box 633 • 915 E. Fourth Street • Mt. Vernon, Indiana 47620-0633

Mt. Vernon Area Chamber of Commerce
Comment Response

No response required.

DINAMO
425 Sixth Avenue
Pittsburgh, PA
15219-1811
(412) 392-4550
Fax (412) 392-4520

The Association
for the Development
of Inland Navigation in
America's Ohio Valley

February 25, 2000

Colonel Robert Slockbower
Louisville District Engineer
c/o Veronica Rife, Project Manager
US Army Corps of Engineers
P.O. Box 59
Louisville, Kentucky 40201-0059

Dear Colonel Slockbower:

DINAMO is a multi-state, membership-based association of private sector, state government, and labor leaders whose singular purpose is to expedite the modernization of the lock and dam system on the Ohio River and its navigable tributaries. We have participated fully in the planning process of the Corps with respect to the Ohio River Main Stem Study and the Interim Feasibility Report for the John T. Myers and Greenup Locks Improvements. We fully concur with your recommendations to construct additional capacity at each facility. The recommendations to extend the locks 600' at the auxiliary chambers certainly appear to be the most cost effective choice and will lead to a more efficient movement of commodities in the middle Ohio River as commerce continues to grow.

The river is an economic generator. Hundreds of thousands of jobs in the Ohio Valley have followed the more than $100 billion of private investment in plants and equipment along the river system. Today there are more than 1000 manufacturing firms, power plants, terminals and docks located adjacent to the river and its navigable tributaries. They have chosen river industrial sites because of the benefits of lower cost water transportation and the availability of large amounts of water for processing. Improvements at facilities such as John T. Myers and Greenup Locks and Dams are needed to protect the private investment that has already been made and to create new jobs in future years.

These public investments have a very favorable benefit-cost relationship. And private sector interests, of course, will be paying 50% of the costs of these improvements through utilization of funds in the Inland Waterways Trust Fund. We support your process, and we fully support your recommendations. Thank you for your attention to this matter.

Very truly yours,

R. Barry Palmer
Executive Director

DINAMO
Comment Response

No response required.

DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service

Centers for Disease Control
and Prevention (CDC)
Atlanta GA 30341-3724

February 25, 2000

Veronica Rife, Project Manager
U.S. Army Engineer District, Louisville
P.O. Box 59 ATTN: PM-C
Louisville, KY 40201-0059

Dear Ms. Rife:

We have completed our review of the Draft Environmental Impact Statement (DEIS) for the J.T. Myers and Greenup Locks Improvements. We are responding on behalf of the U.S. Public Health Service, Department of Health and Human Services (DHHS). For future reference, please remove the address on your mailing list for "Special Programs, Ctr for Environ. Health, Ctrs for Disease Control." We request that future correspondence related to the National Environmental Policy Act (NEPA), specifically requests for DHHS review of environmental impact statements, be sent the following address for coordination:

Kenneth W. Holt, MSEH
Centers for Disease Control & Prevention
National Center for Environmental Health
Emergency & Environmental Health Services Division (F16)
4770 Buford Hwy. NE
Atlanta, GA 30341-3724

We concur that the proposed project, with planned mitigation measures, would minimally affect human health and safety, short-term land use, transportation, and waste management of the area. We believe our potential concerns have been addressed in this draft document, and we have no specific comments to offer at this time.

Thank you for the opportunity to review and comment on this DEIS. Please send us a copy of the Final DEIS, and any future environmental impact statements which may indicate potential public health impact and are developed under the National Environmental Policy Act (NEPA).

Sincerely,

Kenneth W. Holt

Kenneth W. Holt, MSEH
Emergency & Environmental Health Services Division
National Center for Environmental Health (F16)

U.S. Public Health Service
Department of Health & Human Services (DHHS)
Centers for Disease Control & Prevention (CDC)
Comment Response

No response required.

four Seasons MOTEL
2400 West Fourth Street Mt. Vernon, Indiana 47620 (812) 838-4821 • 1-800-264-1405 • Fax 838-4287

Four Seasons Motel
Comment Response

February 25, 2000

No response required.

Colonel Robert Slockbower
Louisville District Engineer
c/o Veronica Rife, Project Manager
U. S. Army Corps of Engineer District
Louisville, P.O. Box 59
Attn.: PM-C, Louisville, KY 40201-0059

Dear Veronica Rife:

We express approval and support of your recommendations for additional capacity at the John T.Myers Locks and Dam. Many complaints were heard when tows had to be broken when the 1200' locks were closed. If delays occur often, the increased cost to the barge lines will be passed along to all of us-farmers, businesses, and laborers (as users of the products carried by the barges).

Therefore, we think added capacity to the 600' auxiliary chamber should be the number one priority!

Sincerely,

Four Seasons Motel

Rodney Cox Jean Cox Sheri Banks

RC/ju

INDIANA PORT COMMISSION I.S.T.A. CENTER • 150 WEST MARKET STREET • STE. 603 • INDIANAPOLIS, INDIANA 46204 • USA • (317) 232-9200 • FAX: (317) 232-0137

Clark Maritime Centre
5100 Port Road
Jeffersonville, Indiana 47130
FTZ #170
(812) 283-9662

Indiana's International Port /Burns Harbor at Portage
6625 S. Boundary Drive
Portage, Indiana 46368
FTZ #152
(219) 787-8636

Southwind Maritime Centre
1700 Bluff Road
Mount Vernon, Indiana 47620
FTZ #177
(812) 838-4382

February 26, 2000

Colonel Richard Slockbower
Louisville District Engineer
c/o Veronica Rife, Project Manager
U.S. Army Corps of Engineer District
Louisville, P.O. Box 59
ATTN: PM-C, Louisville, KY 40201-0059

Dear Colonel Slockbower:

I am writing to express my approval and support of the U.S. Army Corps of Engineers' recommendations concerning the John T. Myers and Greenup Locks and Dams. As the former port director at the Clark Maritime Centre in Jeffersonville, Indiana and the executive director of the Indiana Port Commission, I understand the economic impact Ohio River maritime commerce brings to the Midwest. The efficient transit of goods along one of our nation's busiest waterways would not be possible without the Corps' commitment to lock and dam modernization.

It is my understanding that the recommended improvements at both John T. Myers and Greenup involve the extension of the shorter 600-foot lock to 1,200 feet in length. I am also aware both locks and dam systems would require the installation of a Miter Gate Quick Changeout System; which, in the event lock gate repairs are necessary, allows those repairs to be made in a more efficient manner.

Thank you for your attention to this issue. If you have any questions or comments, please do not hesitate to contact me at 317.232.9200.

Sincerely,

Don W. Miller, Jr.
Executive Director
Indiana Port Commission

Indiana Port Commission
Comment Response

No response required.

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APPENDIX L

ACRONYMS AND ABBREVIATIONS

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ACRONYMS AND ABBREVIATIONS

AADT	Average Annual Daily Traffic
AAHU	Average Annual Habitat Unit
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
B&NL	Burgess & Niple Limited
BH	Backhoe
CAA	Clean Air Act
CEQ	Council on Environmental Quality
CFM	Cubic Foot per Minute
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CIP	Cast-in-place
CO	Carbon Monoxide
Corps	United States Army Corps of Engineers
cu yd	Cubic Yards
CWL	Construction Work Limits
db	Decibel
dBA	Decibel A-weighted
DUDs	Duck-use Days
EIS	Environmental Impact Statement
EM	Environmental Manual
EPA	Environmental Protection Agency
ER	Engineering Regulation
FIVCO ADD	Five County Area Development District
ft	Foot/Feet
fps	Feet per second
FTEs	Full Time Equivalents
gal	Gallon
gpd	Gallon per Day
gpm	Gallon per Minute
Greenup L&D	Greenup Locks and Dam
GVW	Gross Vehicle Weight
HCs	Hydrocarbons
HCM	Highway Capacity Manual
HEP	Habitat Evaluation Procedures
hp	Horse Power
HTRW	Hazardous, Toxic and Radioactive Waste
IAC	Indiana Administrative Cod e
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
IFIM	Instream Flow Incremental Methodology
KAR	Kentucky Administrative Regulation
KDEB	Kentucky Division of Explosives and Blasting
KDEP/DWM	Kentucky Department of Environmental Protection, Division of Waste Management
KDNR	Kentucy Department of Natural Resources
KRS	Kentucky Revised Statutes

KWH	Kilowatt per Hour
LD	Loader
LOS	Level of Service
MCLs	Maximum Contaminant Levels
ME	Mechanical
mg/L	Milligrams per Liter
MGQCS	Miter Gate Quick Changeout System
µg/L	Micrograms per Liter
ml	Milliliters
MP	Mile Post
Myers L&D	John T. Myers Locks and Dam
NAAQS	National Ambient Air Quality Standards
NAVD 1929	National Geodetic Vertical Datum of 1929
NAGPRA	Native American Graves Protection and Repatriation Act
NAVPAT	Navigation Predictive Analysis Technique
NED	National Economic Development
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_x	Nitrogen Oxides
ODNR	Ohio Department of Natural Resources
ODS	Organics Detection System
Ohio EPA/DSIWM	Ohio Environmental Protection Agency, Division of Solid and Infectious Waste Management
O&M	Operations and Maintenance
ORMSS	Ohio River Mainstem Systems Study
ORSANCO	Ohio River Valley Water Sanitation Commission
OSHA	Occupational Safety and Health Administration
PA	Programmatic Agreement
Pb	Lead
PCB	Polychlorinated biphenyls
PM	Particulate Matter
POL	Petroleum, Oil, Lubricant
psi	Pound per Square Inch
QUEPAT	Queing Predictive Analysis Technique
RED	Regional Economic Development
RCRA	Resource Conservation and Recovery Act
RCRIS	Resource Conservation and Recovery Information System
SCS	Soil Conservation Service
SHPO	State Historic Preservation Officer
SO_X	Sulfur Oxides
SO_2	Sulfur Dioxide
SR	State Route
TVA	Tennessee Valley Authority
USFWS	United States Fish and Wildlife Service
VOCs	Volatile Organic Compounds

APPENDIX M

GLOSSARY

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A-weighted. The A-scale sound level is a quantity, in decibels, read from a standard sound-level meter with A-weighting circuitry. The A-scale weighting discriminates against the lower frequencies according to a relationship approximating the auditory sensitivity of the human ear. The A-scale sound level measures approximately the relative "noisiness" or "annoyance" of many common sounds.

Absorbent. A material capable of taking in a substance, such as oil.

Accelerometer. An apparatus for measuring the velocity imparted by an explosion.

Acute Standard. Daily maximum.

Ambient Air Quality Standards. Standards established on a state or federal level that define the limits for airborne concentrations of designated "criteria" pollutants (e.g. nitrogen dioxide, sulfur dioxide, carbon monoxide, particulate matter, ozone, and lead) to protect public health with an adequate margin of safety (primary standards) and to protect public welfare, including plant and animal life, visibility, and materials (secondary standards).

Ambient Air. Any unconfined portion of the atmosphere: open air, surrounding air.

Attainment Area. An area considered to have air quality as good as or better than the National Ambient Air Quality Standards as defined in the Clean Air Act. An area may be an attainment area for one pollutant and a non-attainment area for others.

Backwater Area. A small, generally shallow body of water attached to the main channel, with little or no current of its own.

Ballast. Anything giving stability and firmness.

Bedrock. A general term for solid rock that lies beneath soil, loose sediments, or other unconsolidated material.

Benthic Species. Those organisms living at or near the bottom of a body of water.

Bioengineering. Biological application of engineering principles or engineering equipment.

Biota. All the plant and animals living in a particular area.

Bobbers. Buoys.

Bulkhead. A low wall of stones, concrete, or piling built to protect a shore from wave action.

Caissons. A watertight enclosure in which underwater construction work can be done.

Chronic Standard. A 30-day average.

Clamshell. A dredging bucket with hinges like the shell of a clam.

Cobble. Rock fragments that measure 7.6 cm (3 inches) to 25.4 cm (10 inches) in diameter.

Debris. Any material, including floating or submerged trash, suspended sediment, or bed load, moved by a flowing stream.

De minimis Criteria. Something that is so small as to be negligible or insignificant.

Decibels. The unit of measurement of sound level calculated by taking ten times the common logarithm of the ratio of the magnitude of the particular sound pressure to the standard reference sound pressure of 20 micropascals and its derivatives.

Derrick Boat. A framework or tower used for hoisting and lowering.

Dry Dock. A large dock in the form of a basin from which the water can be emptied or pumped, used for building or repairing a structure or ship below the water line.

Easement. A legal instrument enabling the giving, selling, or taking or certain land or water rights without transfer of title.

Effluent. Discharged wastewater.

Embayment. A bay.

Endangered Species. A species that is threatened with extinction throughout all or a significant portion of its range.

Environment. The total surroundings of an organism, including other plants and animals and those of its own kind.

Erosion. The wearing away of the land surface by various agents such as wind and water.

Esplanade. A public walk or roadway, often along a shore.

Floodplain. The lowland that borders a stream or river and is found outside of the floodway. It is usually dry, but subject to flooding.

Floodway. The channel of a river or stream and the adjacent land that must be reserved to discharge flood waters.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Graving Yard. An area used for the temporary placement of construction materials during construction activities.

Habitat. A place where particular plants or animals occur or could occur.

Hazardous Waste. A waste or combination of wastes which, because of its quantity, concentration, or physical, chemical, or infectious characteristics, may either cause, or significantly contribute to an increase in mortality or an increase in serious, irreversible illness; or pose a substantial present or potential hazard to human health or the environment when improperly treated, stored, transported, disposed, of, or otherwise managed.

Herbaceous. A plant with no persistent woody stem above ground.

Intermittent Stream. A stream that carries water only part of the time, generally after periods of heavy runoff from storms or groundwater discharge.

Lock. An enclosed part of a canal or waterway equipped with gates so that the level of water can be changed to raise or lower boats from one level to another.

Miter Gate. Structure or device for controlling the rate of water flow into or from a canal or lock system.

Mitigation. A method or action to reduce or eliminate adverse program impacts.

Mooring. Apparatus used to secure or confine a ship to a place.

Noise. Sound that is perceived by humans as annoying and unwanted.

Plowzone. The zone of soil and subsoil usually less than 12 inches below the soil surface.

Poiree Dam. A temporary dam that is constructed with an A-frame that is mounted over the sill with boards on its face.

Palustrine. The palustrine environment includes all non-tidal wetlands dominated by trees, shrubs, persistent emergent macrophytes, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 5 parts per thousand (ppt). It also includes wetlands lacking such vegetation, but with all of the following four characteristics: (1) area less than 8 ha (20 acres); (2) active wave-formed or bedrock shoreline features are lacking; (3) water depth in the deepest part of the basin is less than 2 m at low water; and (4) salinity due to ocean-derived salts is less than 5 ppt.

Resource (natural). Any form of matter or energy obtained from the environment that meets human needs.

Riparian Zones. Land areas directly influenced by a body of water. Usually such areas have visible vegetation or physical characteristics showing this water influence. Stream sides, lake borders, and marshes are typical riparian areas.

Riprap. A layer, facing, or protective mound of stones or rocks placed to prevent erosion, scour, or sloughing of a structure or embankment.

River Mile. Distance measured along the thalweg, a line running along the deepest part of the river channel.

Riverine Zones. Open-water habitats. Typically include all open water areas that occur within a defined channel of a stream as well as along perennial and intermittent stretches of streams.

Root Wad. Root mass of a tree, also called butt end.

Runoff. The non-infiltrating water entering a stream or other conveyance channel shortly after a rainfall.

Sediment. Particles derived from rock or biological sources that have been transported by water.

Sedimentation. The process of depositing sediment from suspension in water.

Sensitive Receptor. Areas defined as those sensitive to noise, such as hospitals, residential areas, schools, outdoor theaters, and protected wildlife species.

Significance. A measure of the context and intensity of an impact. Context analysis refers to society as a whole, the affected region (of the impact area), the affected interests, and the locality. Intensity refers to the severity of impact. Intensity can be based on: benefit to the environment; effects to public health or safety; proximity to cultural/historical resources, or other ecologically critical areas; public controversy; risk to humans; connection to future project impacts; connection with cumulative impacts; effects to objects listed on the National Register of Historic Places; threat to endangered or threatened species; or violation of a State or local environmental protection law.

Silt Fences. Mitigation measure that prevents sedimentary particles from entering a specific area or body of water.

Site. Any location where humans have altered the terrain or discarded artifacts.

Species. All organisms of a given kind; a group of plants or animals that breed together but are not bred successfully with organisms outside their group.

Spoil. Soil or rock material excavated from a canal, ditch, basin, or similar construction.

Stanchion. An upright bar, beam or post used as a support.

Tailwater. The area encompassed from the base of the dam to the downstream end of the lock wall.

Threatened Species. A species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Toe-in. Towboat is grounded into the shoreline while waiting for lock passage.

Tributary. A stream or other body of water that contributes to another stream.

Turbidity. When water contains suspended matter that interferes with the passage of light through the water or in which visual depth is restricted. The turbidity may be caused by a wide

variety of suspended materials, such as clay, silt, finely divided organic and inorganic matter, soluble colored organic compounds, plankton and other microscopic organisms and similar substances.

Weir. A horizontal structure or barrier placed across or parallel to a river to raise or divert water.

Wetlands. Those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and other similar areas .

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